



# UNDERGRADUATE ANNOUNCEMENTS

2014-2015



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# NOTIFICATION OF RIGHTS UNDER THE FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT (FERPA)

The Family Educational Rights and Privacy Act (FERPA) affords students certain rights with respect to their education records. These rights include:

1. The right to inspect and review the student's education records within 45 days of the day the University receives a request for access.

A student should submit to the registrar, dean, head of the academic department, or other appropriate official, a written request that identifies the record(s) the student wishes to inspect. The University official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the University official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.

(2) The right to request the amendment of the student's education records that the student believes are inaccurate, misleading, or otherwise in violation of the student's privacy rights under FERPA.

A student who wishes to ask the University to amend a record should write the University official responsible for the record, clearly identify the part of the record the student wants changed, and specify why it should be changed.

If the University decides not to amend the record as requested, the University will notify the student in writing of the decision and the student's right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.

*Note:* The challenge of a student under this paragraph is limited to information which relates directly to the student and which the student asserts is inaccurate or misleading. With regard to a student's grade, this right does not permit the student to contest a grade on the grounds that a higher grade is deserved, but only to show that the grade has been inaccurately recorded.

(3) The right to provide written consent before the University discloses personally identifiable information from the student's education records, except to the extent that FERPA authorizes disclosure without consent.

The University discloses education records without a student's prior written consent under the FERPA exception for disclosure to school officials with legitimate educational interests. A school official is a person employed by the University in an administrative, supervisory, academic or research, or support staff position (including law enforcement unit personnel and health staff); contractors, consultants, volunteers and other outside parties to whom the institution has outsourced institutional services or functions instead of using University employees or officials (such as an attorney, auditor, or collection agent); a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.

A school official has a legitimate educational interest if the official needs to review an education record in order to fulfill his or her professional responsibilities for the University.

Upon request, the University also discloses education records without consent to officials of another school in which a student seeks or intends to enroll.

(4) The right to refuse to permit the designation of any or all of the following categories of personally-identifiable information as directory information, which is not subject to the above restrictions on disclosure: student's full name, permanent address and telephone number, local address and telephone number, e-mail address, Clemson identification number (the number that begins with a C on the student ID card and is also referred to as a student's XID), username, state of residence, date and place of birth, marital status, academic class, class schedule and class roster, name of advisor, major field of study, including the college, division, department or program in which the student is enrolled, participation in officially recognized activities and sports, weight and height of members of athletic teams, dates of attendance and graduation, degrees and honors and awards received including selection to a dean's list or honorary organization and the grade point average of students selected, and the most previous educational institution attended. Photographic, video, or electronic images of students taken and maintained by the University are also considered directory information.

Directory information may be disclosed by the University for any purpose, at its discretion. Any student wishing to exercise his/her right to refuse to permit the designation of any or all of the above categories as directory information must give written notification to the Registration Services Office (E-206 Martin Hall) by the last day to register for the enrollment period concerned as published in the Clemson University calendar.

(5) The right to file a complaint with the U.S. Department of Education concerning alleged failures by the University to comply with the requirements of FERPA. The name and address of the Office that administers FERPA is Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW, Washington, DC 20202-5901.

## DISCLOSURE OF EDUCATION RECORDS IN HEALTH AND SAFETY EMERGENCIES

If the University determines that there is **an articulable and significant threat to the health or safety of a student or other individuals**, FERPA allows disclosure of information from education records to **appropriate parties whose knowledge of the information is necessary to protect the health and safety of the student or other individuals**.<sup>1</sup>

- “Articulable and significant threat” means that if a school official can explain why, based on all the information then available, he or she reasonably believes that a student poses a significant threat, such as a threat of substantial bodily harm, to any person, including the student, the University may disclose education records to any person whose knowledge of information from those records will assist in protecting a person from that threat.
- “Appropriate parties” include parents of the student; parents may be notified when there is a health or safety emergency involving their son or daughter.

In making a determination to disclose information, the University may take into account the totality of the circumstances pertaining to a threat to the safety or health of the student or other individuals. An emergency can be related to the threat of an actual, impending, or imminent emergency, such as a terrorist attack, a natural disaster, a campus shooting, or the outbreak of an epidemic such as e-coli. An emergency can also be a situation in which a student gives sufficient, cumulative warning signs that lead the school official to believe the student may harm himself at any moment.

The FERPA **recordkeeping requirements** require the University to record 1) the articulable and significant threat that formed the basis for the disclosure and 2) the parties to whom the information was disclosed. This record will demonstrate what circumstances led to the determination that a health or safety emergency existed and how the disclosure was justified. The record must be made within a reasonable period of time after the disclosure was made. The record must be maintained with the education records of the student for as long as the student’s education records are maintained. **After disclosing information under the FERPA health and safety exception, employee(s) must document the following information and forward the records to the dean of students.**

- Student’s name
- Name(s) of person(s) to whom the student posed a significant health or safety threat
- Description of the significant threat to health or safety
- Description of the circumstances and the information available (including relevant dates)
- Description of all the information that was disclosed
- Names(s) of person(s) to whom the information was disclosed (person(s) whose knowledge of the information would have assisted in protecting a person or persons from the threat; or student’s parents)
- Date(s) disclosure was made
- Name(s) of CU employee(s) who determined a health and safety emergency existed
- Name(s) of CU employee(s) who disclosed the information
- Date the record of disclosure was made

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<sup>1</sup>Note: The FERPA health and safety requirements do not apply to disclosures to a Clemson University employee with a legitimate educational interest in the information. Information from education records may be disclosed to University employee if the information is necessary for that employee to perform work appropriate to his or her position.

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# ACADEMIC CALENDAR 2014-2015

## Summer 2014

May 13, Tu	Late enrollment
May 14, W	Classes begin
May 15, Th	Last day to register or add a class
May 21, W	Last day to drop a class or withdraw from the University without a W grade
Jun 3, Tu	Last day to order diploma for August graduation
Jun 16-20, M-F	Long summer break
Jul 1, Tu	Last day for instructors to issue midterm evaluations
Jul 4, F	July 4th holiday
Jul 8, Tu	Last day to drop a class or withdraw from the University without final grades
Jul 30, W	Last day of classes
Jul 31, Th	Study day
Aug 1 & 4, F & M	Examinations
Aug 5, Tu	2:00 p.m.-Deadline to submit candidate grades
Aug 6, W	9:00 a.m.-Deadline to submit other grades
Aug 7, Th	Candidates for graduation may access grades
Aug 8, F	Graduation

## First Summer 2014

May 13, Tu	Late enrollment
May 14, W	Classes begin
May 15, Th	Last day to register or add a class
May 19, M	Last day to drop a class or withdraw from the University without a W grade
May 30, F	Last day for instructors to issue midterm evaluations
Jun 3, Tu	Last day to order diploma for August graduation
Jun 5, Th	Last day to drop a class or withdraw from the University without final grades
Jun 17, Tu	Last day of classes
Jun 18, W	Study day
Jun 19-20, Th-F	Examinations
Jun 25, W	9:00 a.m.-Deadline to submit grades

## Second Summer 2014

Jun 23, M	Orientation
Jun 24, Tu	Late enrollment
Jun 25, W	Classes begin
Jun 26, Th	Last day to register or add a class
Jun 30, M	Last day to drop a class or withdraw from the University without a W grade
Jul 4, F	July 4th holiday
Jul 14, M	Last day for instructors to issue midterm evaluations
Jul 18, F	Last day to drop a class or withdraw from the University without final grades
Jul 30, W	Last day of classes
Jul 31, Th	Study day
Aug 1 & 4, F & M	Examinations
Aug 5, Tu	2:00 p.m.-Deadline to submit candidate grades
Aug 6, W	9:00 a.m.-Deadline to submit other grades
Aug 7, Th	Candidates for graduation may access grades
Aug 8, F	Graduation

## Summer Minimester A 2014

May 13, Tu	Late enrollment
May 14, W	Classes begin
May 14, W	Last day to register or add a class
May 15, Th	Last day to drop a class or withdraw from the University without a W grade
May 21, W	Last day for instructors to issue midterm evaluations
May 23, F	Last day to drop a class or withdraw from the University without final grades
May 30, F	Last day of classes
Jun 2, M	Examinations
Jun 3, Tu	Last day to order diploma for August graduation
Jun 4, W	9:00 a.m.-Deadline to submit grades

## Summer Minimester B 2014

Jun 3, Tu	Late enrollment
Jun 3, Tu	Classes begin
Jun 3, Tu	Last day to register or add a class
Jun 3, Tu	Last day to order diploma for August graduation
Jun 4, W	Last day to drop a class or withdraw from the University without a W grade
Jun 10, Tu	Last day for instructors to issue midterm evaluations
Jun 12, Th	Last day to drop a class or withdraw from the University without final grades
Jun 19, Th	Last day of classes
Jun 20, F	Study day
Jun 23, M	Examinations
Jun 25, W	9:00 a.m.-Deadline to submit grades

## Summer Minimester C 2014

Jun 24, Tu	Late enrollment
Jun 24, Tu	Classes begin
Jun 24, Tu	Last day to register or add a class
Jun 25, W	Last day to drop a class or withdraw from the University without a W grade
Jul 1, Tu	Last day for instructors to issue midterm evaluations
Jul 3, Th	Last day to drop a class or withdraw from the University without final grades
Jul 4, F	July 4th holiday
Jul 11, F	Last day of classes
Jul 14, M	Examinations
Jul 16, W	9:00 a.m.-Deadline to submit grades

## Summer Minimester D 2014

Jul 16, W	Late enrollment
Jul 16, W	Classes begin
Jul 16, W	Last day to register or add a class
Jul 17, Th	Last day to drop a class or withdraw from the University without a W grade
Jul 23, W	Last day for instructors to issue midterm evaluations
Jul 25, F	Last day to drop a class or withdraw from the University without final grades
Aug 1, F	Last day of classes
Aug 4, M	Examinations
Aug 5, Tu	2:00 p.m.-Deadline to submit candidate grades
Aug 6, W	9:00 a.m.-Deadline to submit other grades
Aug 7, Th	Candidates for graduation may access grades
Aug 8, F	Graduation

**Fall Semester 2014**

Aug 18-19, M-Tu	Late enrollment
Aug 19, Tu	University Convocation
Aug 20, W	Classes begin
Aug 26, Tu	Last day to register or add a class
Sep 2, Tu	Last day to drop a class or withdraw from the University without a W grade
Sep 9, Tu	Last day to order diploma for December graduation
Oct 10, F	Last day for instructors to issue midterm evaluations
Oct 24, F	Last day to drop a class or withdraw from the University without final grades
Nov 3-4, M-Tu	Fall break
Nov 5, W	Registration for spring and summer terms begins
Nov 26-28, W-F	Thanksgiving holidays
Dec 4-5, Th-F	Classes meet; exams permitted in labs only
Dec 8-12, M-F	Examinations
Dec 15, M	9:00 a.m.–Deadline to submit candidate grades
Dec 17, W	9:00 a.m.–Deadline to submit other grades
Dec 17, W	Candidates for graduation may access grades
Dec 18, Th	Graduation

**First Fall 2014**

Aug 18, M	Late enrollment
Aug 18, M	Classes begin
Aug 25, M	Last day to register or add a class
Aug 29, F	Last day to drop a class or withdraw from the University without a W grade
Sep 9, Tu	Last day to order diploma for December graduation
Sep 12, F	Last day for instructors to issue midterm evaluations
Sep 19, F	Last day to drop a class or withdraw from the University without final grades
Oct 3, F	Last day of classes
Oct 6-10, M-F	Examinations
Oct 15, W	9:00 a.m.–Deadline to submit grades

**Second Fall 2014**

Oct 13, M	Late enrollment
Oct 13, M	Classes begin
Oct 20, M	Last day to register or add a class
Oct 24, F	Last day to drop a class or withdraw from the University without a W grade
Nov 3-4, M-Tu	Fall break
Nov 5, W	Registration for spring and summer terms begins
Nov 11, Tu	Last day for instructors to issue midterm evaluations
Nov 18, Tu	Last day to drop a class or withdraw from the University without final grades
Nov 26-28, W-F	Thanksgiving holidays
Dec 5, F	Last day of classes
Dec 8-12, M-F	Examinations
Dec 15, M	9:00 a.m.–Deadline to submit candidate grades
Dec 17, W	9:00 a.m.–Deadline to submit other grades
Dec 17, W	Candidates for graduation may access grades
Dec 18, Th	Graduation

**Fall Minimester A 2014**

Aug 18-19, M-Tu	Late enrollment
Aug 20, W	Classes begin
Aug 20, W	Last day to register or add a class
Aug 21, Th	Last day to drop a class or withdraw from the University without a W grade
Aug 29, F	Last day for instructors to issue midterm evaluations
Sep 2, Tu	Last day to drop a class or withdraw from the University without final grades
Sep 9, Tu	Last day of classes
Sep 9, Tu	Last day to order diploma for December graduation
Sep 10, W	Study day
Sep 11, Th	Examinations
Sep 15, M	9:00 a.m.–Deadline to submit grades

**Fall Minimester B 2014**

Sep 16, Tu	Late enrollment
Sep 17, W	Classes begin
Sep 17, W	Last day to register or add a class
Sep 18, Th	Last day to drop a class or withdraw from the University without a W grade
Sep 26, F	Last day for instructors to issue midterm evaluations
Sep 30, Tu	Last day to drop a class or withdraw from the University without final grades
Oct 7, Tu	Last day of classes
Oct 8, W	Study day
Oct 9, Th	Examinations
Oct 15, W	9:00 a.m.–Deadline to submit grades

**Fall Minimester C 2014**

Oct 13, M	Late enrollment
Oct 13, M	Classes begin
Oct 13, M	Last day to register or add a class
Oct 14, Tu	Last day to drop a class or withdraw from the University without a W grade
Oct 22, W	Last day for instructors to issue midterm evaluations
Oct 24, F	Last day to drop a class or withdraw from the University without final grades
Oct 31, F	Last day of classes
Nov 3-4, M-Tu	Fall break
Nov 5, W	Examinations
Nov 7, F	9:00 a.m.–Deadline to submit grades

**Fall Minimester D 2014**

Nov 11, Tu	Late enrollment
Nov 12, W	Classes begin
Nov 12, W	Last day to register or add a class
Nov 13, Th	Last day to drop a class or withdraw from the University without a W grade
Nov 21, F	Last day for instructors to issue midterm evaluations
Nov 26-28, W-F	Thanksgiving holidays
Nov 25, Tu	Last day to drop a class or withdraw from the University without final grades
Dec 5, F	Last day of classes
Dec 8, M	Examinations
Dec 15, M	9:00 a.m.–Deadline to submit candidate grades
Dec 17, W	9:00 a.m.–Deadline to submit other grades
Dec 17, W	Candidates for graduation may access grades
Dec 18, Th	Graduation

**Spring Semester 2015**

Jan 5, M	Orientation
Jan 5-6, M-Tu	Late enrollment
Jan 7, W	Classes begin
Jan 13, Tu	Last day to register or add a class
Jan 19, M	Martin Luther King Jr. holiday
Jan 21, W	Last day to drop a class or withdraw from the University without a W grade
Jan 28, W	Last day to order diploma for May commencement
Feb 27, F	Last day for instructors to issue midterm evaluations
Mar 13, F	Last day to drop a class or withdraw from the University without final grades
Mar 16-20, M-F	Spring break
Mar 30, M	Registration for fall term begins
Apr 4-11, Sa-Sa	Honors and Awards Week
Apr 23-24, Th-F	Classes meet; exams permitted in labs only
Apr 27-May 1, M-F	Examinations
May 5, Tu	9:00 a.m.-Deadline to submit candidate grades
May 6, W	9:00 a.m.-Deadline to submit other grades
May 7, Th	Candidates for graduation may access grades
May 8, F	Commencement

**First Spring 2015**

Jan 5, M	Late enrollment
Jan 5, M	Classes begin
Jan 12, M	Last day to register or add a class
Jan 19, M	Martin Luther King Jr. holiday
Jan 20, Tu	Last day to drop a class or withdraw from the University without a W grade
Jan 28, W	Last day to order diploma for May commencement
Feb 2, M	Last day for instructors to issue midterm evaluations
Feb 9, M	Last day to drop a class or withdraw from the University without final grades
Feb 23, M	Last day of classes
Feb 24-27, Tu-F	Examinations
Mar 2, M	9:00 a.m.-Deadline to submit grades

**Second Spring 2015**

Mar 2, M	Late enrollment
Mar 2, M	Classes begin
Mar 9, M	Last day to register or add a class
Mar 13, F	Last day to drop a class or withdraw from the University without a W grade
Mar 16-20, M-F	Spring break
Mar 30, M	Registration for fall term begins
Apr 3, F	Last day for instructors to issue midterm evaluations
Apr 10, F	Last day to drop a class or withdraw from the University without final grades
Apr 24, F	Last day of classes
Apr 27-May 1, M-F	Examinations
May 5, Tu	9:00 a.m.-Deadline to submit candidate grades
May 6, W	9:00 a.m.-Deadline to submit other grades
May 7, Th	Candidates for graduation may access grades
May 8, F	Commencement

**Spring Minimester A 2015**

Jan 5-6, M-Tu	Late enrollment
Jan 7, W	Classes begin
Jan 7, W	Last day to register or add a class
Jan 8, Th	Last day to drop a class or withdraw from the University without a W grade
Jan 19, M	Martin Luther King Jr. holiday
Jan 19, M	Last day for instructors to issue midterm evaluations
Jan 21, W	Last day to drop a class or withdraw from the University without final grades
Jan 28, W	Last day of classes
Jan 28, W	Last day to order diploma for May commencement
Jan 29, Th	Study day
Jan 30, F	Examinations
Feb 2, M	9:00 a.m.-Deadline to submit grades

**Spring Minimester B 2015**

Feb 2, M	Late enrollment
Feb 2, M	Classes begin
Feb 2, M	Last day to register or add a class
Feb 3, Tu	Last day to drop a class or withdraw from the University without a W grade
Feb 11, W	Last day for instructors to issue midterm evaluations
Feb 13, F	Last day to drop a class or withdraw from the University without final grades
Feb 20, F	Last day of classes
Feb 23, M	Examinations
Mar 2, M	9:00 a.m.-Deadline to submit grades

**Spring Minimester C 2015**

Mar 2, M	Late enrollment
Mar 2, M	Classes begin
Mar 2, M	Last day to register or add a class
Mar 3, Tu	Last day to drop a class or withdraw from the University without a W grade
Mar 11, W	Last day for instructors to issue midterm evaluations
Mar 13, F	Last day to drop a class or withdraw from the University without final grades
Mar 16-20, M-F	Spring break
Mar 27, F	Last day of classes
Mar 30, M	Registration for fall term begins
Mar 30, M	Examinations
Apr 6, M	9:00 a.m.-Deadline to submit grades

**Spring Minimester D 2015**

Apr 6, M	Late enrollment
Apr 6, M	Classes begin
Apr 6, M	Last day to register or add a class
Apr 7, Tu	Last day to drop a class or withdraw from the University without a W grade
Apr 15, W	Last day for instructors to issue midterm evaluations
Apr 17, F	Last day to drop a class or withdraw from the University without final grades
Apr 24, F	Last day of classes
Apr 27, M	Examinations
May 5, Tu	9:00 a.m.-Deadline to submit candidate grades
May 6, W	9:00 a.m.-Deadline to submit other grades
May 7, Th	Candidates for graduation may access grades
May 8, F	Commencement

Note: Dates on this calendar were accurate at the time of printing. Dates, however, may change as conditions warrant. Current information is available at [www.registrar.clemson.edu/html/Acad\\_Cal.htm](http://www.registrar.clemson.edu/html/Acad_Cal.htm).

# ADMINISTRATION

## UNIVERSITY GOVERNANCE AND ADMINISTRATION

The University is governed by a board of 13 members, six selected by the state Legislature and seven self-perpetuating life members, in accord with the will of Thomas Green Clemson. The Board of Trustees is primarily responsible for adopting the long-range objectives of the University and the basic policies for achieving them; providing policy instruction for long-range planning; adopting the statutes of the University; electing the president of the University; employing the secretary of the board; maintaining ownership of University assets; and overseeing the evaluation of the University.

The president is the chief executive officer of the University, providing leadership to all phases of University planning, coordinating the operations of all units of the University, carrying out major University public relations functions, evaluating the results of University plans, and appointing personnel who report to the president. The day-to-day operations of the University are administered by the president and executive officers for advancement, public service and agriculture, student affairs, and research and economic development.

The provost and vice president for academic affairs is the chief academic officer of the University. The provost is responsible directly to the president for all academic matters and has administrative jurisdiction over teaching and computing services. Vice provosts assist in administering and performing duties in coordinating graduate and undergraduate curricula; supervising computer information services, the libraries, scholarship and award programs; and other duties assigned by the provost.

Academic deans are the chief administrative officers of their individual colleges and report directly to the provost. They provide leadership in formulating and carrying out educational policy; review and make recommendations on personnel matters; and carry out and administer the academic and financial affairs of their colleges.

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# GENERAL INFORMATION

## PURPOSE OF CATALOG

This catalog gives a general description of Clemson University and provides prospective students with detailed information regarding the various colleges and departments within the University and curricula offered by the University. Inasmuch as the educational process necessitates change, the information and educational requirements in this catalog represent a flexible program that may be altered where such alterations are thought to be in the mutual interest of the University and its students.

The provisions of this catalog do not constitute a contract that may be accepted by students through registration and enrollment in the University. The University reserves the right to change without notice any fee, provision, offering, or requirement in this catalog and to determine whether a student has satisfactorily met its requirements for admission or graduation. The University further reserves the right to require a student to withdraw from the University for cause at any time.

Each curriculum shall be governed by the requirements in effect on the date of enrollment. If a student withdraws from the University and subsequently returns or does not remain continuously enrolled (summers excluded), the requirements in effect at the time of return will normally prevail.

## STUDENT RESPONSIBILITY

All colleges and departments establish certain academic requirements that must be met before a degree is granted. Advisors, department chairs, and deans are available to help the student understand and meet these requirements; but the student is responsible for fulfilling them. If, at the end of a student's course of study, the requirements for graduation have not been satisfied, the degree will not be granted. For this reason, it is important for students to acquaint themselves with all academic requirements throughout their college careers and to be responsible for completing all requirements within prescribed deadlines and time limits.

## VISION STATEMENT

Clemson University will be one of the nation's top-20 public universities.

## MISSION STATEMENT

Clemson University was established to fulfill our founder's vision of a "high seminary of learning" to develop "the material resources of the State" for the people of South Carolina. Nurtured by an abiding land grant commitment, Clemson has emerged as a research university with a global vision. Our primary purpose is educating undergraduate and graduate students to think deeply about and engage in social, scientific, economic, and professional challenges of our times. The foundation of this mission is the generation, preservation, communication, and application of knowledge. The University also is committed to the personal growth of the individual and promotes an environment of good decision making, healthy and ethical lifestyles, and tolerance and respect for others. Our distinctive character is shaped by a legacy of service, collaboration, and fellowship forged from and renewed by the spirit of Thomas Green Clemson's covenant.

## UNIVERSITY DESCRIPTION

Clemson University is a selective, public, research university in a college-town setting. Clemson's desire is to attract a capable, dedicated and diverse student body of approximately 20,000 undergraduate and graduate students, with priority to students from South Carolina. The University offers a wide array of high quality baccalaureate programs built around a distinctive core curriculum. Graduate, continuing education, doctoral and research programs contribute to the state of knowledge and to the economic future of the state, nation and world. The University provides bachelor's, master's and doctoral degrees in more than 100 majors through five academic colleges: the College of Agriculture, Forestry and Life Sciences; the College of Architecture, Arts and Humanities; the College of Business and Behavioral Science; the College of Engineering and Science; and the College of Health, Education and Human Development.

Clemson combines the benefits of a major research university with a strong commitment to undergraduate teaching and individual student success. Students, both undergraduate and graduate, have opportunities for unique educational experiences throughout South Carolina, as well as in other countries. Experiential learning is a valued component of the Clemson experience, and students are encouraged through Creative Inquiry, internships, and study abroad, to apply their learning beyond the classroom. Electronic delivery of courses and degree programs also provide a variety of learning opportunities. Clemson's extended campus includes teaching sites in Greenville and Charleston, five research campuses, and five public service centers throughout the state of South Carolina, as well as four international sites.

The University is committed to exemplary teaching, research and public service in the context of general education, student engagement and development, and continuing education. In all areas, the goal is to develop students' communication and critical-thinking skills, ethical judgment, global awareness, and scientific and technological knowledge. The distinctive character of Clemson is reflected in the culture of collegiality and collaboration among faculty, students, staff, the administration, and the university board.

## HISTORY

When one man of wisdom and foresight can look beyond the despair of troubled times and imagine what could be, great things can happen. That is what the University's founder, Thomas Green Clemson, was able to do in the post-Civil War days. He looked upon a South that lay in economic ruin, once remarking that "conditions are wretched in the extreme" and that "people are quitting the land." Still, among the ashes he saw hope. Joined by his wife, Anna Calhoun Clemson, Mr. Clemson envisioned what could be possible if the South's youth were given an opportunity to receive instruction in scientific agriculture and the mechanical arts. He once wrote, "The only hope we have for the advancement of agriculture (in the U.S.) is through the sciences, and yet there is not one single institution on this continent where a proper scientific education can be obtained." When he was president of the Pendleton Farmers Society in 1866, Mr. Clemson served on a committee whose purpose was to promote the idea of founding an institution for "educating the people in the sciences" and "which will in time secure permanent prosperity."

When he died on April 6, 1888, a series of events began that marked the start of a new era in higher education in the state of South Carolina, especially in the study of science, agriculture, and engineering. Mr. Clemson's passing set the stage for the founding of the university that bears his name—the beginning of a true "people's university," which opened the doors of higher education to all South Carolinians, rich and poor alike. In his will, which he signed November 6, 1886, Mr. Clemson bequeathed the Fort Hill plantation and a considerable sum from his personal assets for the establishment of an educational institution of the kind he envisioned. He left a cash endowment of approximately \$80,000, as well as the 814-acre Fort Hill estate, to South Carolina for such a college. The biggest obstacle in the creation of an agricultural college—the initial expense—was removed by Mr. Clemson's bequest.

On November 27, 1889, Governor John Richardson signed the bill accepting Thomas Clemson's gift. Soon after, a measure was introduced to establish the Clemson Agricultural College, with its trustees becoming custodians of Morrill Act and Hatch Act funds made available for agricultural education and research by federal legislative acts. The founding of Clemson Agricultural College supplanted the South Carolina College of Agriculture and Mechanics in Columbia, which had been designated in 1880.

Thomas Green Clemson came to South Carolina when he married Anna Maria Calhoun, daughter of South Carolina's famous statesman John C. Calhoun. Born in Philadelphia, Mr. Clemson was educated at schools both in the United States and France, where he attended lectures at the Royal School of Mines, studied with prominent scientists in the private laboratories of the Sorbonne Royal College of France, and received his diploma as an assayer from the Royal Mint in Paris. Mr. Clemson, then in his mid-20s, returned to America greatly influenced by his European studies. He became a great advocate of the natural sciences, achieving a considerable reputation as a mining engineer and a theorist in agricultural chemistry. He also was a gifted writer whose articles were published in the leading scientific journals of his day, an artist and a diplomat who represented the U.S. government as *chargé d'affaires* to Belgium for almost seven years.

Mr. Clemson had a lifelong interest in farming and agricultural affairs. He served as the nation's first superintendent of agricultural affairs (predecessor to the present secretary of agriculture position) and actively promoted the establishment and endowment of the Maryland Agricultural College in the 1850s. Though remembered today for these accomplishments, Thomas Clemson made his greatest historical contribution when, as a champion of formal scientific education, his life became intertwined with the destiny of educational and economic development in South Carolina. Although he never lived to see it, his dedicated efforts culminated in the founding of Clemson Agricultural College.

At the time of his death, Mr. Clemson was living at the Fort Hill homeplace, which today is a national historic landmark and provides a historic centerpiece for the Clemson University campus. He had inherited the house and plantation lands upon the death of Mrs. Clemson in 1875.

Clemson College formally opened in July 1893, with an enrollment of 446. From the beginning, the college was an all-male military school. It remained this way until 1955, when the change was made to "civilian" status for students and Clemson became a coeducational institution. In 1964, the college was renamed Clemson University as the state legislature and the state courts formally recognized the school's expanded academic offerings, Ph.D. granting status and research pursuits. On November 27, 1989, the University observed the 100<sup>th</sup> anniversary of the state's acceptance of the terms and conditions of Mr. Clemson's bequest.

The enrollment of Clemson has grown from 446 students at the opening of the University to 21,303 for the first semester 2013-2014. Since the opening of the University, 122,726 students have been awarded bachelor's degrees. During this same period, 426 associate degrees, 34,124 master's, 415 education specialist, and 4,136 doctor's degrees have been awarded, a total of 161,827 degrees.

Today, more than a century later, the University is much more than its founder ever could have imagined. With its diverse learning and research facilities, the University provides an educational opportunity not only for the people of the state, as Mr. Clemson dreamed, but for thousands of young men and women throughout the country and the world.

## THE CAMPUS

The 1,400-acre Clemson University campus is sited on the former homestead of statesman John C. Calhoun. Nestled in the foothills of the Blue Ridge Mountains and adjacent to Lake Hartwell, the campus commands an excellent view of the mountains to the north and west, some of which attain an altitude of over 5,000 feet above mean sea level.

The Norfolk and Southern Railway and U.S. highways 76 and 123 provide easy access to the city of Clemson and to the University. Oconee County Airport is four miles from the library. Both Atlanta and Charlotte are two hours driving time away.

Campus architecture is a pleasing blend of traditional and modern facilities enhanced by a beautiful landscape of towering trees, grassy expanses, and flowering plants. Academic, administrative, and student service buildings on campus represent an insured value of \$627 million. Clemson University's real estate holdings include more than 32,000 acres of forestry and agricultural lands throughout the state, the majority of which are dedicated to Clemson's research and public-service missions.

Fort Hill, the former home of John C. Calhoun inherited by Thomas Clemson, and the Hanover House are both listed on the National Register of Historic Places and are open to the public. The campus also has two recognized historic districts.

The Strom Thurmond Institute houses the institute offices, Senator Thurmond's papers and memorabilia, and the special collections of the Cooper Library, including papers of John C. Calhoun and James Byrnes, two of the most important South Carolinians since 1787. The institute is a part of an instructional and public-service district that includes the Brooks Center for the Performing Arts and the Madren Center for Continuing Education. Clemson offers limited graduate and undergraduate coursework in Greenville, SC. Also located in

Greenville is the Clemson University International Center for Automotive Research (CU-ICAR), a 250-acre advanced-technology research campus where university, industry and government organizations collaborate.

## ACCREDITATION

Clemson University is accredited by the Southern Association of Colleges and Schools Commission on Colleges to award bachelor's, master's, education specialist, and doctoral degrees. Contact the Commission on Colleges at 1866 Southern Lane, Decatur, Georgia 30033-4097 or call 404-679-4500 for questions about the accreditation of Clemson University.

Curricula are accredited by the Association to Advance Collegiate Schools of Business (AACSB), Accrediting Board for Engineering and Technology (ABET), American Council for Construction Education, Accreditation Council for Education in Nutrition and Dietetics (ACEND), American Society of Landscape Architects, Commission on Collegiate Nursing Education (CCNE), Council for Accreditation of Counseling and Related Education Programs (CACREP), National Architectural Accrediting Board (NAAB), National Association of Schools of Art and Design, National Council for Accreditation of Teacher Education (NCATE), National Recreation and Park Association Council on Accreditation (NRPA), Planning Accreditation Board, and Society of American Foresters. Documentation of accreditation is available in the college deans' offices.

## ADVISING POLICY

Academic advising is an on-going educational process that connects the student to the University. Academic advising supports the University's mission of preparing the student for learning beyond the confines of the academy. Academic advisors represent and interpret University policies and procedures to the student and help the student navigate the academic and organizational paths of the institution.

To ensure that students receive both personal and professional assistance in navigating through curricula and University requirements toward degree completion and graduation, each student is assigned to an academic advisor (either professional or faculty advisor). Advisors are available to assist students with issues related to degree planning, course selection, withdrawals, degree requirements, academic policies, academic difficulty, campus resources, internships/practicum opportunities, and career/graduate school planning. Students are responsible for adhering to academic policies, preparing for advising meetings and taking ownership for their educational experience. Students receive their academic advising materials and number from their advisors during their pre-registration advising meetings. Students uncertain of their assigned advisor are encouraged to seek assistance from the departmental office/advising center for their major. For more information, visit <http://www.clemson.edu/academics/advising/>.

## LIBRARIES

The Libraries' Web site at [www.clemson.edu/library](http://www.clemson.edu/library) provides access to a multitude of information resources, including the library catalog, hundreds of databases, more than 40,000 electronic journals, and information regarding library services.

The Libraries' services include circulation, reference, interlibrary loan, class instruction, and tours. Cooper Library houses a computer lab (maintained by CCIT), Java City Cyber Café, Snax & Stax convenience store, and a popular reading and audiobooks collection. Equipment available includes photocopiers, scanners, fax machines, and wireless laptops in Cooper Library and a color laser printer, engineering plotter, and large-format photocopier in the Gunnin Architecture Library.

The Clemson University Libraries consist of a main library and two branches. R.M. Cooper Library, Clemson's main library, is a six-floor building located at the center of campus. Most of the books and journals are located there, as well as government publications, microforms, and media. The Gunnin Architecture Library in Lee Hall contains collections that focus on architecture, city and regional planning, construction science, landscape architecture, and visual arts. Special Collections, on the lower level of the Strom Thurmond Institute, houses the rare book collection, University Archives, and many manuscript collections, including the papers of John C. Calhoun and Thomas Green Clemson.

Total holdings for the library system include more than 1.8 million items, including books, periodicals, electronic resources, government publications and patents, musical recordings, DVDs and videos, audiobooks, maps, and microforms.

## COMPUTING RESOURCES

Clemson Computing and Information Technology (CCIT) provides comprehensive services to students and employees, including laptop support, training, printing and plotting, computer repair, software licenses, wireless access points, network and information security, course management system and more.

Public access computer labs across campus contain high-end Windows PCs or Macs, and black and white laser printing equipment. Students receive a specified quota of pages and plots per semester in these labs. Any printing and plotting beyond the limit is charged to the student. Lab computers provide the same access as personal student laptops using the Clemson software image. Software and access available in the labs include Internet, e-mail, Google Apps for Education, and the Microsoft Office Suite with Word, Excel, Access, Outlook, and PowerPoint applications, as well as other software. Clemson provides site licenses for several software packages, including Trend Micro virus protection, Microsoft Office and Adobe Creative Cloud. Visit the CCIT Web site for more details before purchasing expensive software that may be provided for all students.

### Getting Help

The Customer Support Center, located on the second floor of Cooper Library, serves as a central point of contact for general computing assistance, laptop support and repair, and consulting services. Students may call (864) 656-3494, e-mail [ITHelp@clemson.edu](mailto:ITHelp@clemson.edu), or walk in during hours of operation (check the CCIT Web site at <http://www.clemson.edu/ccit>). CCIT help is also available in the Cooper Library Learning Commons on Level 4.

### E-mail and Accessing Your Account

Each student's e-mail address is [username@clemson.edu](mailto:username@clemson.edu). CCIT automatically creates a Google Apps for Education account at <http://g.clemson.edu> for all incoming students. Google Apps offers full e-mail functionality and large data storage, plus Google

Calendar, Google Docs and Google Sites. Google Mail is the recommended student e-mail system, and it allows students to use Google's e-mail with their Clemson e-mail address while at Clemson and following graduation. Student e-mail accounts (*username@clemson.edu*) are automatically forwarded to their Google Mail accounts (*username@g.clemson.edu*). Students can change and verify their e-mail forwarding preferences at [http://www.clemson.edu/email\\_forwarding](http://www.clemson.edu/email_forwarding).

### Computer Training

CCIT provides computer training and support to faculty, staff and students in the use of the MyCLE portal and the Web-based course management system (Blackboard), the Clemson computer network and many desktop applications. Training is offered as part of regular University courses, short courses, special training programs and e-learning courses. Distance-learning processes and technologies are also supported. A part-time trainer is available in the Cooper Library Learning Commons for individual and group assistance. Visit the CCIT Web site for a complete list of training resources.

### Wired and Wireless Access

The university computer network is accessible through wired network connections in all on-campus residences or through the University's extensive wireless network, which provides coverage to most areas of campus. Eduroam is Clemson's primary wireless network, allowing students to connect securely with their Clemson user name and password. Visit the CCIT Web site for more information and complete coverage details, including a list of compatible wireless cards.

### Security

Clemson University requires all users to run virus protection and install the latest operating system patches on their computers for the security of all network users. Clemson has a site license for the Trend Micro virus protection products. These and other licensed software options are available on the CCIT Web site.

### Laptop Program

Laptops are required for all undergraduate and MBA graduate students. While students may bring any laptop that meets the minimum specifications, recommended laptops are posted on the CCIT Web site. Clemson University works with vendors to offer recommended laptops with custom warranties at special prices. Students with recommended laptops receive priority support on campus for both software and hardware issues as a part of their purchase package. Repair technicians on campus can complete warranty repairs on these laptops. Students with recommended laptops kept in Hardware Repair for an extended period of time may be able to check out a loaner laptop if available. CCIT also services and repairs many other brands of computers for a fee, or under manufacturer's warranty, if applicable.

### Additional Information

Additional information—including information about Google Apps for Education (GAE); computing and research, software licensing; IT e-mail alerts; ClemsonGuest wireless access service; the Acceptable Use Policy for Students; and the Campus Computer Store—is available at <http://www.clemson.edu/ccit> or by e-mailing [ITHELP@clemson.edu](mailto:ITHELP@clemson.edu).

## CALHOUN HONORS COLLEGE

Established in 1962, the Calhoun Honors College strives to enrich the educational experience of highly motivated, academically talented students by providing opportunities for scholarship and research not always available to undergraduates. Honors students become part of a dynamic academic community dedicated to the study of ideas and the life of the mind.

Calhoun Honors students are offered the opportunity to take a wide variety of specialized honors courses. These include a series of intensive Freshman Colloquia; Calhoun Honors Seminars emphasizing multidisciplinary approaches and contemporary issues; and numerous courses satisfying general education, major or minor requirements. Honors students are also encouraged to pursue research-based programs leading to departmental honors.

Freshman admission to Calhoun Honors College requires the submission of an application separate from and in addition to the application for undergraduate admission to Clemson University. In addition to the student's application, the Honors College requires a copy of the student's high school transcript and two letters of recommendation, one from a high school guidance counselor and one from a teacher. Admission is highly selective and is based, in part, on the quality of the applicant pool and the availability of space for freshmen in the Honors College.

Currently-enrolled Clemson students may apply for membership if they are full-time, degree-seeking undergraduates and have earned a cumulative grade-point average of 3.50 or higher. Students must have at least four semesters remaining to complete their degree requirements.

Additional special opportunities for honors students include summer study programs in Brussels, Belgium, and India; EUREKA!, a summer research program for entering freshmen; and other study abroad opportunities. Each of these programs is competitive and requires a separate application.

The Calhoun Honors College is institutionally responsible for nationally competitive fellowships and awards, including Rhodes, Marshall, Truman, Goldwater and Fulbright.

In addition to the intellectual challenge of Honors, advantages of membership include priority course scheduling, honors housing (on a space-available basis), extended library loan privileges, a series of discussion programs, and special lectures and cultural events. Visit [www.clemson.edu/cuhonors](http://www.clemson.edu/cuhonors) for more information.

## COOPERATIVE EDUCATION PROGRAM

The Cooperative Education Program (Co-op) is an academic engaged-learning program within the Center for Career & Professional Development. The program provides students with an opportunity to alternate semesters of academic study with semesters of paid, discipline-specific experience as they work and learn under a mentor in their field of study. Co-op assignments add a contextual dimension to the curriculum and challenge students to think critically and creatively as they engage in problem-solving activities and projects within the work setting. Through this program, employers serve as Teaching Partners of

the University and the co-op experience becomes an integral part of the student's education. The student's experience is closely monitored by the co-op faculty/academic staff throughout his/her participation in the program. Cooperative Education, as the term implies, represents a collaborative effort between the University and participating employers.

Students may qualify for the Cooperative Education Program after satisfactorily completing 30 credit hours of academic coursework. Transfer students may qualify in one semester. Students normally enter the program as sophomores or juniors and complete from two-five rotations in a co-op assignment. Completion of the co-op program is a curricular requirement for some majors, such as Packaging Science. Packaging Science students normally complete two back-to-back co-op rotations during a six-month period.

Students enrolled in the program register for the appropriate co-op course number (e.g. COOP 1010, 1020, etc.) for each rotation and receive a grade of Pass or No Pass. Students receive academic recognition on the transcript for completing the program, although no credit hours are awarded. Students pay a program participation fee each academic term that coincides with a co-op rotation. In responding to questions about student status related to health insurance, taxes, loans, etc., the University classifies a student on a co-op rotation as a full-time continuing student. Additional information is available at [http://career.clemson.edu/co-op\\_and\\_internships/](http://career.clemson.edu/co-op_and_internships/) or by calling the program office at 864-656-3150.

## STUDY AND WORK ABROAD PROGRAMS

Through the Office of International Affairs, students may choose from a variety of study abroad programs. Program length can range from short-term, such as during spring break, to a summer session, to a full semester or year abroad. Programs vary to fulfill the academic and discipline-specific needs of students. There are programs for every academic major at Clemson. Exchange programs are available with top institutions around the world, such as ICHEC Management School in Brussels, Belgium; the University of Aberdeen in Scotland; University of Newcastle in Australia; University of Stellenbosch in South Africa; and Universidad de Alicante in Spain. Programs are available in virtually every country in the world: Argentina, Chile, China, Czech Republic, Ecuador, England, France, Germany, Japan, Mexico, Russia, Scotland, and many more. Both Clemson-sponsored programs and exchange programs allow students to enroll and pay fees directly to Clemson while they study abroad. Transfer credit normally applies within the major with prior academic department approval. Financial aid and scholarships also transfer for many of the programs abroad.

Internships and work abroad programs are also available. Students should plan early for their study abroad experience. First priority application deadlines are usually in September/October for spring programs, in February/March for fall, academic year, and summer programs. Interested students should contact the Office of International Affairs, E-307 Martin Hall, at the beginning of each semester and throughout the academic year to explore opportunities abroad. Additional information is available at [www.clemson.edu/studyabroad](http://www.clemson.edu/studyabroad) or by e-mailing [abroad-l@clemson.edu](mailto:abroad-l@clemson.edu).

## RESERVE OFFICERS TRAINING CORPS

### Air Force and Army

The departments of the Air Force and the Army maintain ROTC units at Clemson University. Their mission is to produce officers of high quality for technical and nontechnical careers in the U.S. Air Force and Army. Two-, three-, and four-year programs are available. The four-year program consists of the basic course for freshmen and sophomores and the advanced course for juniors and seniors.

Scholarships, available to selected ROTC students, pay for tuition, books, and laboratory expenses, in addition to a variable stipend ranging from (Air Force) \$250-\$400 and (Army) \$300-\$500 (depending on their group) per month during the school year. Nonscholarship advanced Cadets also receive a stipend. Basic course credit may be awarded to students having prior military service. Reserve or National Guard duty can be guaranteed by the U.S. Army.

Cadets who complete the Advanced or Professional Course and satisfy commissioning requirements are appointed Second Lieutenants. Ample opportunity exists for graduate study in both services, with temporary deferments possible.

## HONOR ORGANIZATIONS

Clemson University has a number of academic honorary societies that recognize outstanding scholarship by students, faculty, and staff:

Alpha Epsilon Delta (Premedical)  
 Alpha Epsilon Lambda (Graduate Students)  
 Alpha Kappa Delta (Sociology)  
 Alpha Lambda Delta (Freshmen)  
 Alpha Pi Mu (Industrial Engineering)  
 Alpha Zeta (Agriculture)  
 Beta Alpha Psi (Accounting and Financial Management)  
 Beta Gamma Sigma (Business)  
 Blue Key (Juniors and Seniors)  
 Calhoun Honors Society (Honors College)  
 Chi Epsilon (Civil Engineering)  
 Eta Kappa Nu (Electrical and Computer Engineering)  
 Eta Sigma Gamma (Health Education)  
 Gamma Epsilon Tau (Graphic Communications)  
 Golden Key National Honor Society (Juniors/Seniors)  
 Kappa Delta Pi (Education)  
 Keramos (Ceramic and Materials Engineering)  
 Lambda Pi Eta (Communication Studies)  
 Mortar Board (Seniors)  
 Mu Beta Psi (Music)  
 Mu Kappa Tau (Marketing)  
 Omicron Delta Epsilon (Economics)  
 Omicron Delta Kappa (Leadership)  
 Order of Omega (Seniors)  
 Phi Beta Kappa  
 Phi Kappa Phi  
 Phi Psi (Textiles)  
 Phi Sigma Pi (Honorary)  
 Pi Delta Phi (French)  
 Pi Sigma Alpha (Political Science)  
 Pi Tau Sigma (Mechanical Engineering)  
 Psi Chi (Psychology)  
 Sigma Tau Delta (English)  
 Tau Beta Pi (Engineering)  
 Tau Sigma Delta  
 Upsilon Pi Epsilon (Computer Science)  
 Xi Sigma Pi (Forestry)

## CLEMSON UNIVERSITY EXPERIMENT STATION

The Clemson University Experiment Station is part of a nationwide system of scientists working to improve the quality of life for people in their home states, the nation, and the world.

Both undergraduate and graduate students work with researchers to develop science-based information needed to address issues such as agricultural productivity and profitability, economic and community development, environmental conservation, food safety and nutrition and youth development. Clemson scientists have been involved in agricultural and forestry research since the University was founded in 1889. Today research is conducted in state-of-the-art laboratories, on farms and forests on Clemson's campus, and at five research and education centers strategically located in the state's distinct soil and climate regions.

Clemson researchers collaborate with colleagues on studies that span the globe. These include the genetic structure and functions for plants and animals, the impact of urban sprawl on the environment, techniques to reduce bullying in schools, the active ingredients in medicinal plants, and the use of nanotechnology in food packaging to detect contamination. Their work has produced more than 100 new varieties of food and fiber crops and more than 40 patents. Each year work is conducted on more than 150 projects funded through federal, state and private sources, including the U.S. Department of Agriculture, the U.S. Forest Service, the National Science Foundation, the South Carolina General Assembly, and corporate partners.

## CLEMSON UNIVERSITY FOUNDATION

The Clemson University Foundation is a nonprofit organization that solicits, manages, and administers gifts from private sources for academic programs at Clemson University.

Chartered in 1933, the foundation is a primary component of the Advancement Division of the University. There are 36 elected members of the Board of Directors. Currently, 32 of those are Clemson alumni. The board also includes seven automatic directors; 16 ex officio directors, including a graduate and an undergraduate student representative; and 10 honorary directors.

The foundation operates through committees that report via an executive committee to the full board. These include the Audit, Finance, Development, Human Resources, Investment, Nominations, and Policy and Constitution Committees. Fund raising is in concert with the University and through the Development Committee and, as is currently the case, a Campaign Executive Committee. This includes solicitation of annual, major, planned, corporate and foundation gifts in support of University priorities and coordination of college-based fund-raising initiatives. Organizations affiliated with the Foundation include the Clemson University Continuing Education/Conference Complex Corporation, the Clemson University Land Stewardship Foundation, the Clemson University Real Estate Foundation, and the Wallace F. Pate Foundation for Environmental Research and Education. As of June 30, 2013, the Clemson University foundation managed over 1,670 endowments. As of December 31, 2013, the combined CUF-CU Endowment totaled approximately \$580 million.

## CLEMSON ALUMNI ASSOCIATION

The Clemson Alumni Association's action phrase is "Your Lifelong Connection to Clemson." Its mission is to serve, to inform, to involve. The Alumni Association works for the more than 112,000 alumni located around the world, sponsoring programs to provide a link between students of yesterday, today, and tomorrow.

In conjunction with volunteers and traveling University staff, Clemson Clubs and Clemson activities are conducted around the world. Alumni are kept informed through the award-winning *Clemson World* magazine and at [alumni.clemson.edu](http://alumni.clemson.edu). Students, alumni, and constituency programs, as well as publications and electronic resources, form the basis for an array of services offered to alumni, students, parents, and friends of the University.

All services of the Alumni Association are coordinated out of the Alumni Center, a campus focal point built, furnished, and equipped entirely by gifts from alumni specifically for that purpose. The University Visitors Center, a gift of the Class of 1944, is adjacent to the Alumni Center and is an excellent stop for anyone visiting or returning to campus.

Alumni-sponsored awards programs, such as the Distinguished Service Award, Alumni Fellows, professorships, scholarships, and awards for outstanding teaching, research, and public service, are among the prestigious awards given by the Clemson Alumni Association.

Alumni employees coordinate the Alumni Career Services program and the activities of the open-membership student organization, Student Alumni Association. From the Welcome Back Festival held each August to the Senior Picnic held each April, the Alumni Association provides a lifelong connection to Clemson.

## CAMPUS VISITS AND TOURS

One of the best ways to discover all Clemson has to offer is through a visit to the campus. The Class of 1944 Visitors Center helps host the Clemson experience of prospective students. Information, audio-visuals, and tours are all easily accessible. The Visitors Center is located just off of Highway 93 adjacent to the Alumni Center. Regular hours of operation are Monday-Friday, 8:00 a.m.-4:30 p.m.; Saturday, 9:00 a.m.-4:30 p.m.; and Sunday, 1:00-4:30 p.m. Hours vary according to the academic calendar, university holidays, and the home football schedule.

Walking tours, guided by volunteer student members of the University Guide Association, are available at 9:45 a.m. and 1:45 p.m. Monday-Saturday and 1:45 p.m. on Sundays. Tour schedules also vary based on the academic calendar, university holidays, and the home football schedule. Tours are conducted rain or shine, last about two hours, and include an information segment at the beginning. Reservations are required and can be arranged on-line at [www.clemson.edu/visitors/index.html](http://www.clemson.edu/visitors/index.html) or by calling (864) 656-4789.

## ADMISSION

Complete Admission information is available at [www.clemson.edu/admission](http://www.clemson.edu/admission).

## APPLICATION INFORMATION

Applicants should apply online at [www.clemson.edu](http://www.clemson.edu). Freshman candidates are especially encouraged to submit preliminary applications and sit for the SAT or ACT, including the writing test, during the spring semester of their junior year.

Candidates should understand that admission is closed when all classroom space has been committed. The majority of freshman admission decisions are communicated during the middle of February. Transfer students seeking entrance in August are usually notified between February and July. Candidates must pay a nonrefundable application fee. This fee is not applicable toward tuition and/or other University fees.

### Application Deadlines

#### For Freshman Applicants

Spring semester	December 15
Fall semester	
Priority deadline	December 1
Final deadline	May 1

#### For Transfer Applicants

Spring semester	December 1
Fall semester	July 1

## FRESHMEN

Admission to the University is competitive and is based primarily upon high school curriculum, grades, class standing, and SAT or ACT scores. An applicant's intended major and state residency also receive consideration. To apply for admission, a candidate must submit a high school transcript through his/her counselor and have results of the SAT or ACT sent directly from the testing agency. In addition, all applicants for freshman admission should complete the following courses in high school:

### English—4 credits

All four courses must have strong grammar and composition components, with at least one in English literature and at least one in American literature. College preparatory English I, II, III, and IV will meet these requirements.

### Mathematics—3 credits

These include algebra I (for which applied mathematics I and II may count together as a substitute if a student successfully completes algebra II), algebra II, and geometry.

### Laboratory Science—3 credits

Two must be selected from biology I, chemistry I, or physics I.

### Foreign Language—3 credits

All three must be earned in the same language.

### Social Sciences—3 credits

American history is required. One-half credit of government and one-half credit of economics are also recommended.

### Fine Arts—1 credit

### Physical Education/ROTC—1 credit

### Other—2 credits

One of these must be a fourth year of mathematics, laboratory science, or foreign language. Students interested in engineering are strongly encouraged to take a fourth year of mathematics. This course should be selected from precalculus, calculus, statistics, or discrete mathematics. The second credit must be in advanced mathematics, computer science, or a combination of these; or one unit of world history, world geography, or western civilization.

The SAT or ACT examination scores, rank in class, academic preparation, and recommendation of the high school counselor will be weighed carefully in the decision-making process. The applicant's acceptance will be confirmed upon presentation of a final high school transcript indicating continued academic progress and graduation.

## TRANSFER STUDENTS

Students should have official transcript(s) sent directly to Clemson's Admissions Office from the registrar of each college or university where credit was earned. A transcript that states "Issued to Student" is considered unofficial. Unless so stated on the transcript, the applicant should also present statements of honorable dismissal and of eligibility to return to the institution last attended. Transfer admission is moderately competitive. To increase their chances for admission, applicants should have the following qualifications:

- Completion of a year of college study after high school graduation with 30 semester hours (or 45 quarter hours) of transferable credit
  - A minimum 2.5 grade-point average (3.0 preferred).
- Note: Majors such as Communication Studies; Construction Science and Management; General Engineering; Health Science; Landscape Architecture; Nursing; Parks, Recreation, and Tourism Management; Production Studies in Performing Arts; Visual Arts; Early Childhood Education; Elementary Education; Special Education; and some of the Secondary Education majors may have more selective admission standards. Students interested in these majors are encouraged to apply early and contact the Office of Admissions for current admission requirements.
- Freshman-level math, science, and English requirements for the intended major at Clemson

Application deadlines are December 1 for consideration for the spring semester and July 1 for consideration for the fall semester. In most cases, admission decisions will be made once the year of college study is completed. Summer school applicants should have all credentials sent at least two weeks prior to the beginning of the term. Admission is closed when all classroom space has been committed.

Information regarding transfer from a South Carolina technical college is contained in the brochure *Advanced Standing*, available through the Office of Admissions at the address below. Prospective transfer students are also encouraged to refer to the University's Web site at [www.clemson.edu](http://www.clemson.edu) or the South Carolina Commission on Higher Education's Web site at [www.che400.state.sc.us](http://www.che400.state.sc.us).

Students who are unsure to which South Carolina college or university they would like to transfer after their initial coursework at a South Carolina technical college may follow the transfer block system. These transfer blocks are posted at [www.clemson.edu/admissions/undergraduate/transferring-credits/equivalency.html](http://www.clemson.edu/admissions/undergraduate/transferring-credits/equivalency.html). Depending on the student's chosen major, some courses may not be applicable toward a Clemson degree. Contact the Office of Admissions for information.

### Transfer Admissions Officers

Becky D. Pearson, Associate Director of Admissions  
Kathryn Rice, Assistant Director of Admissions  
Lisi C. Campbell, Transfer Credit Coordinator  
105 Sikes Hall  
Clemson University  
Box 345124  
Clemson, SC 29634-5124  
Phone: (864) 656-2287  
FAX: (864) 656-2464

## Transfer Credit

Coursework completed with a grade of C or better at other regionally accredited institutions, including correspondence courses, telecourses, on-line courses, and exempted courses, will be evaluated for transfer credit. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be determined through an evaluation by the Office of Admissions, and will be based on content, level, comparability to Clemson courses, and applicability to Clemson degree requirements. Transfer courses are evaluated as a direct Clemson equivalent, elective credit, or not college transferable credit. Subject area electives are listed on the transfer course summary as 1999, 2999, 3999 or 4999. Courses that do not have direct Clemson equivalencies may possibly be substituted for required courses in a degree program with approval of the student's major advisor. Questions about how a course has been evaluated should be directed to the department responsible for teaching the course. If a course does not have a direct Clemson equivalency, the following abbreviations are used: NCT 0001 (Not College Transferable), ELEC 0001 (free elective credit), and 1999, 2999, 3999 or 4999 (subject area elective). To view a listing of how courses have been evaluated previously, visit the Transfer Course Equivalency List at <http://virtual.clemson.edu/groups/tcel>. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 3000- or 4000-level Clemson course. Students must submit a registrar's explanation stating that a grade of P or S is equivalent to a C or better before transfer credit may be awarded.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work-related experiences, etc. will not be evaluated for transfer; however, enrolled students may request credit by examination from the appropriate department for any non-transferable learning experience. For additional information, see *Advanced Placement and Credit by Examination* on page 26.

Students transferring may select the curriculum that was outlined in the Clemson University *Undergraduate Announcements* at the time they entered the sending institution, provided they have been in continuous enrollment. Further, transfer students may select any curriculum adopted subsequent to that initial curriculum. After enrolling at Clemson, if a transfer student changes from one major to another, the student will complete all of the requirements included in the new curriculum that are in effect at the time of the change. If all coursework toward a degree is not completed within six years after the initial enrollment at the sending institution, the student may be required to complete additional courses.

## GENERAL INFORMATION

### Entrance Examinations

All freshman candidates and some transfer students must submit scores from either the SAT or ACT. For August enrollment, it is recommended that students complete the SAT or ACT no later than the preceding December. Registration materials for these tests are readily available at high schools or by contacting the College Board at (609) 771-7600 or 1-800-SAT-SCOR or [www.collegeboard.com](http://www.collegeboard.com) or the American College Testing Service at (319) 337-1313 or [www.act.org](http://www.act.org). The College Board's institutional code for Clemson is 5111. The ACT code for Clemson is 3842. All candidates must have their scores reported directly to Clemson by contacting the appropriate testing agency. Photocopies of student test reports or those submitted by third parties, such as high schools and colleges, are not accepted.

## International Baccalaureate (IB)

### Credit Policy

Clemson University endorses the International Baccalaureate (IB) Program and awards credit for IB Higher Level scores as indicated below.

### College Board Advanced Placement Program

The College Board Advanced Placement Program (AP) gives highly motivated high school students an opportunity to begin their college careers during the last year or two of high school. AP participants take college-level courses in high school, sit for nationally administered examinations in the subjects concerned, and submit test grades to Clemson for credit. Credit is awarded to those earning grades of 3, 4, or 5 on AP exams.

Applicants should be sure to include their social security numbers when registering for AP examinations; this will save time and ensure that credit is automatically awarded to their Clemson academic records.

### Dual Enrollment

Dual enrollment courses enable high school students to take college-level courses and earn college credit before graduating from high school. Students should have official transcript(s) sent directly to Clemson's Admissions Office from the registrar of each college or university where credit was earned. A transcript that states "Issued to Student" is considered unofficial. Courses that have previously been evaluated are listed on the Transfer Credit Equivalency List (TCEL) at [virtual.clemson.edu/groups/tcel](http://virtual.clemson.edu/groups/tcel). If a student has taken a course not listed on the TCEL, the course will be evaluated by the Office of Admissions once the student has been accepted by Clemson. Students will be notified by letter of the credit they will receive at Clemson before they enroll in the fall.

### South Carolina Governor's School for Science and Mathematics

Clemson awards college credit for selected biology, chemistry, and mathematics courses taken at the South Carolina Governor's School for Science and Mathematics. Credit is awarded to students enrolled at Clemson University who earn A or B in the SC-GSSM course(s).

### Placement Tests

**Mathematics Placement**—All new freshman and transfer students are required to complete the Clemson Mathematics Placement Test (CMPT). Placement in a mathematics course is determined by each student's CMPT score. Failure to complete the CMPT satisfactorily will result in placement in preparatory work that, in most cases, will not apply toward the general education mathematics requirement. Placement will be adjusted as appropriate after AP and IB scores or credits for previous mathematics courses have been received by Clemson.

IB Higher Level Examination	Score	Clemson Course(s) for Which Credit is Awarded	Credit Hours
Biology	4, 5, 6, 7	BIOL 1030/1050, 1040/1060	8
Business and Management	4, 5, 6, 7	MGT 2010	3
Chemistry	4, 5, 6, 7	CH 1010 (for majors requiring organic chemistry)	4
	4, 5	CH 1010 (for majors not requiring organic chemistry)	4
	6, 7	CH 1010, 1020 (for majors not requiring organic chemistry)	8
Computer Science	4	CPSC 1110	3
	5, 6	CPSC 1010	4
	7	CPSC 1010, 1020	8
Dance	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Design Technology	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Economics	4, 5, 6, 7	ECON 2110, 2120	3
English (Language A: Literature or Language and Literature)	4	ENGL 1999	3
	5, 6	ENGL 1999, 2120	6
	7	ENGL 1999, 1030, 2120	9
Film	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Foreign Language (Language B)	4	ARAB 1010, CHIN 1010, FR 1010, GER 1010, ITAL 1010, JAPN 1010, LATN 1010, PORT 1010, RUSS 1010, or SPAN 1010 (dependent upon language)	4
	5, 6, 7	ARAB 1010, 1020, CHIN 1010, 1020, FR 1010, 1020, GER 1010, 1020, ITAL 1010, 1020, JAPN 1010, 1020, LATN 1010, 1020, PORT 1010, 1020, RUSS 1010, 1020, or SPAN 1010, 1020 (dependent upon language)	8
Geography	4, 5, 6, 7	GEOG 1010	3
History			
Route 1: Higher Level Option—Europe and the Islamic World	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Route 2: Higher Level Option—Asia and Oceania	4, 5, 6, 7	HIST 1930	3
Africa		ELEC 0001 <sup>4</sup>	3
Europe and the Middle East		ELEC 0001 <sup>4</sup>	3
The Americas		ELEC 0001 <sup>4</sup>	3
Information Technology in a Global Society	4, 5, 6, 7	STS 1200	3
Islamic History	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Mathematics	4, 5	MATH 1060 or MATH 1020 <sup>1</sup>	4
	6, 7	MATH 1060 or MATH 1020 <sup>2</sup>	8
Music	4, 5, 6, 7	ELEC 0001 <sup>3,4</sup>	3
Philosophy	4, 5, 6, 7	PHIL 1010	3
Physics	4	PHYS 2070/2090	4
	5, 6, 7	PHYS 2070/2090, 2080/2100	8
Psychology	4, 5, 6, 7	PSYC 2010	3
Social and Cultural Anthropology	4, 5, 6, 7	ELEC 0001 <sup>4</sup>	3
Theatre Arts	4, 5, 6, 7	ELEC 0001 <sup>3,4</sup>	3
Visual Arts	4, 5, 6, 7	ART 1030	3

<sup>1</sup>For students taking the calculus sequence, MATH 1060 and 1080, a score of 4 or 5 on the HL Mathematics examination earns placement in MATH 1080. Upon completion of MATH 1080 with a grade of C or better, credit will be given for MATH 1060. For students taking the MATH 1020 and 2070 calculus sequence, a score of 4 or 5 on the HL Mathematics examination earns placement in MATH 2070. Upon completion of MATH 2070 with a grade of C or better, credit will be given for MATH 1020. If the student does not enroll in MATH 1080 or 2070, or does not pass the sequential class (MATH 2070 or 1080) with a grade of C or higher, three credits of elective (ELEC 0001) will be awarded for a score of 4 or 5 on the Mathematics HL exam.

<sup>2</sup>A score of 6 or 7 on the HL Mathematics examination earns credit for either MATH 1020 or 1060 but not both. Elective credit is awarded for a score of 4 or 5 on the Mathematics IB exam if the student does not enroll in MATH 1080 or 2070 or does not pass the sequential class (MATH 2070 or 1080) with a C or higher.

<sup>3</sup>Courses determined on an individual basis. See department.

<sup>4</sup>ELEC 0001 is a transfer elective credit.

**Foreign Language Placement**—The Department of Languages offers placement tests that students are required to take during summer orientation. Any student who has had at least one year of a foreign language and who decides to continue with the same language at Clemson, must take one of these tests. Applicants desiring advanced placement in a foreign language may take the College Board's SAT Subject Test, Advanced Placement (AP) Examinations, or the International Baccalaureate (IB) Higher Level Examination. SAT Subject Test scores of 450 or higher enable students to exempt one or more

language courses. These students will receive credit following the successful completion (grade of C or better) of a qualifying course at Clemson.

### GED

Candidates submitting General Educational Development (GED) credentials in lieu of a high school diploma must be 19 years of age or older. Official GED score results must be received directly from the General Educational Development Testing Service along with an official copy of the high school transcript and SAT or ACT scores. Applicants presenting

the GED will be reviewed by the Undergraduate Admissions Committee.

### Appeals

Any freshman or transfer candidate who is denied admission may appeal for reconsideration provided the student (1) presents new information, such as improved grades and/or class rank, improved SAT or ACT scores; and (2) submits an on-line statement outlining the rationale for the appeal. All appeals will be reviewed by the Office of Admissions and referred to the Undergraduate Admissions Committee.

Freshman students who are accepted to and enrolled in Clemson University in a conditional admissions program through the appeals process must meet the conditions of their admission or be subject to disenrollment.

### Admissions Exceptions

If it is not possible to make a positive decision on the basis of previous academic performance and SAT or ACT scores, other factors, such as special talents or high school profile, may be considered. Where appropriate, the Office of Admissions will refer such cases to the Undergraduate Admissions Committee. Student athletes who do not meet regular admissions standards may be admitted if they meet Atlantic Coast Conference (ACC) and National Collegiate Athletic Association (NCAA) eligibility requirements.

### College Board College-Level Examination Program (CLEP)

CLEP is designed primarily for adults with nontraditional learning experiences. This program has very limited recognition at Clemson. A few departments accept credit for CLEP subject-matter examinations; however, CLEP General Examinations are not recognized. Credit is awarded for introductory-level courses according to criteria established by the following departments: Chemistry, English (composition only), and Mathematical Sciences (algebra and trigonometry only). Numerical scores plus essays, required when offered as part of a CLEP examination, will be evaluated by the appropriate department.

### ADMISSION DEPOSIT

All accepted freshman and transfer candidates for fall semester are required to submit a nonrefundable \$200 admission deposit. This deposit is applicable toward tuition and other University fees and may be paid by credit card.

### HOUSING

All freshmen who are under the age of 21 at the time of enrollment, who do not live with parent/guardian(s) [within a 50-mile radius of campus], are required to live in University housing for the fall and spring semesters.

For the purpose of this agreement, transfer students are not considered freshmen. Transfer students are housed on a space available basis.

## ADVANCED PLACEMENT CREDIT CHART

Discipline	AP Exam	Score	Clemson Course(s) for which credit is awarded	Credit Hours
ECONOMICS	Microeconomics	3, 4, 5	ECON 2110	3
	Macroeconomics	3, 4, 5	ECON 2120	3
ENGLISH	Literature and Composition <sup>1</sup>	3, 4	ENGL 1999	3
		5	ENGL 1999, 1030	6
	Language and Composition <sup>1</sup>	3, 4	ENGL 1999	3
		5	ENGL 1999, 1030	6
GEOGRAPHY	Both Tests	3, 4, 5	ENGL 1999, 1030	6
	Human Geography	3, 4, 5	GEOG 1010	3
GOVERNMENT	Government & Politics: United States	3, 4, 5	POSC 1010	3
	Government & Politics: Comparative	3, 4, 5	POSC 1040	3
HISTORY	United States History	3	HIST 1010	3
		4, 5	HIST 1010, 1020	6
	European History	3, 4, 5	HIST 1730	3
	World History	3, 4, 5	HIST 1930	3
HUMANITIES	Music Theory	3, 4, 5	MUSC 1420, 1430	4
	Art History	3, 4, 5	AAH 2100	3
	Studio Art: Drawing	3	ELEC 0001 <sup>4</sup>	3
		4	ART 1030	3
		5	ART 1050	3
	Studio Art: 2-D Drawing	3	ELEC 0001 <sup>4</sup>	3
Studio Art: 3-D Drawing	3	ELEC 0001 <sup>4</sup>	3	
LANGUAGES	Chinese Language and Culture	3, 4	CHIN 1010, 1020, 2010	11
		5	CHIN 1010, 1020, 2010, 2020	14
	French Language and Culture	3, 4, 5	FR 1010, 1020	8
	German Language and Culture	3, 4, 5	GER 1010, 1020	8
	Italian Language and Culture	3, 4	ITAL 1010, 1020, 2010	11
		5	ITAL 1010, 1020, 2010, 2020	14
	Japanese Language and Culture	3, 4	JAPN 1010, 1020, 2010	11
		5	JAPN 1010, 1020, 2010, 2020	14
	Latin	3	LATN 1010, 1020, 2010	11
		4, 5	LATN 1010, 1020, 2010, 2020	14
	Spanish Language	3, 4, 5	SPAN 1010, 1020	8
Spanish Literature and Culture		3	SPAN 1010, 1020	8
	4	SPAN 1010, 1020, 2010	11	
	5	SPAN 1010, 1020, 2010, 2020	14	
MATHEMATICS	Calculus AB	3, 4, 5	MATH 1060	4
	Calculus BC <sup>2</sup>	3, 4, 5	MATH 1060, 1080	8
	Statistics	3, 4, 5	STAT 2300	3
PSYCHOLOGY	Psychology	3, 4, 5	PSYC 2010	3
SCIENCES	Biology	3	BIOL 1030/1050, 1040/1060	8
		4, 5	BIOL 1100, 1110	10
	Chemistry	3, 4	CH 1010	4
		5	CH 1010, 1020	8
		3, 4, 5	CPSC 1010	4
	Environmental Science	3, 4, 5	ENSP 2000	3
	Physics B <sup>3</sup>	3, 4, 5	PHYS 2070/2090, 2080/2100	8
	Physics C (Mechanics)	3, 4, 5	PHYS 1220/1240	4
	Physics C (E and M)	3, 4, 5	PHYS 2210/2230	4

<sup>1</sup>Students who earn a score of 3 or 4 should register for ENGL 1030.

<sup>2</sup>Students who earn a score of 2 on the Calculus BC examination, but earns a score of 3 (or better) on the AB subscore of the BC examination, may receive credit for MATH 1060.

<sup>3</sup>Students enrolling in a degree program requiring calculus-based physics (PHYS 1220, 1240, 2210, 2220, 2230, 2240), who earns a grade of 5 on Physics B, will be asked to meet with a departmental representative for further evaluation and placement counseling.

<sup>4</sup>ELEC 0001 is a transfer elective credit

## ORIENTATION PROGRAMS

The University offers a series of orientation programs during the summer for freshmen and transfer students and their parents/guests. All accepted students are required to attend one of the sessions. During orientation, students will have an opportunity to discuss their educational objectives with an advisor, to register for the fall semester, and to learn about student life and other co-curricular activities. All new students will register for their first semester at Clemson during orientation. For more information about the orientation programs fee structure, visit [www.clemson.edu/orientation](http://www.clemson.edu/orientation).

### 2014 Summer Orientation Dates

Freshmen	New Transfer
June 16-17	June 18 (Bridge Only)
June 19-20	June 25
June 23-24	July 9
June 26-27	July 16
June 30-July 1	
July 7-8	
July 10-11	
July 14-15	
July 17-18	

International students are expected to attend an additional session held on August 15, which is conducted by International Student Programs in the Office of Global Engagement.

## INTERNATIONAL UNDERGRADUATES

Admission services for undergraduate international students are provided by the Office of Admissions. International students who come from abroad or transfer from another school must meet academic, language, and financial qualifications as determined by Clemson University. Transcripts, mark sheets, and academic records must be verified by a certified U.S. educational consultant agency. Prospective transfer students must provide translated course descriptions for coursework to be evaluated for Clemson academic credit. The SAT or ACT is required of all international applicants (freshman or transfer). The Test of English as a Foreign Language (TOEFL) is required of applicants from countries where English is not the native language. Financial qualifications are determined by the submission of a financial certification form and bank statements verifying adequate funding. The Office of International Affairs provides visa enabling documents and advising services. For more information, visit [www.clemson.edu/ia/](http://www.clemson.edu/ia/). For International Student Procedures and Requirements, visit <http://www.clemson.edu/admissions/undergraduate/requirements/international.html>.

## SPECIAL STUDENT STATUS

The special student classification is designed for high school graduates who are 19 years of age or older and wish to take a limited number of courses for personal or professional development. This program is not appropriate for individuals who are interested in earning an undergraduate degree, and financial aid is not available. In addition, it is not a "trial admission" status or one for candidates who apply too late to submit credentials for consideration for regular admission. Applicants denied regular admission to Clemson are not eligible to apply as special students.

None of the usual credentials supporting an application are required of special student applicants. A cumulative maximum of 18 undergraduate credit hours may be taken. Applicants should apply online at [www.clemson.edu](http://www.clemson.edu).

## READMISSION OF FORMER UNDERGRADUATES

Undergraduate students (not special or transient students) who have previously attended Clemson, and are not currently enrolled in the current term and wish to return, must apply online at <http://www.registrar.clemson.edu/html/formerStu.htm>. The Undergraduate Application for Re-Admission fee is \$25.00 and online instructions for payment are provided in the application. Acceptance letters and registration materials are mailed to returning students shortly before registration begins. Students are readmitted to the major they were in when they last attended Clemson, unless the major has been discontinued. If you have graduated from Clemson and are applying as a former student returning, then your program will be changed to a "Non-Degree Seeking Undergraduate" until you complete a Change of Program Form with Enrolled Student Services in 104 Sikes Hall. Change-of-major forms are available in the Enrolled Student Services Office. Former students must meet the catalog curriculum requirements for graduation in effect at the time of their return. Students are required to satisfy the University's general education requirements in addition to curricular requirements. Any variations in curricular requirements will be considered under the substitution procedures. If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses. Other information can be obtained from the Registrar's Office.

Any student who is classified as an in-state student for tuition and fees purposes must reaffirm his or her resident status upon application for readmission to the University. If the resident status of an individual changes, that student will be classified as out-of-state for tuition and fees purposes upon readmission to the University. If the resident status is not immediately clear, the student may be required to submit an application for resident status to the Office of Residency Classification.

## ILLEGAL IMMIGRATION REFORM ACT PROCESS

Section 59-101-430 of the South Carolina Code of Laws states:

"(A) An alien unlawfully present in the United States is not eligible to attend a public institution of higher learning in this State, as defined in Section 59-103-5. The trustees of a public institution of higher learning in this State shall develop and institute a process by which lawful presence in the United States is verified. In doing so, institution personnel shall not attempt to independently verify the immigration status of any alien, but shall verify any alien's immigration status with the federal government pursuant to 8 U.S.C. Section 1373 (c).

(B) An alien unlawfully present in the United States is not eligible on the basis of residence for a public higher education benefit including, but not limited to, scholarships, financial aid, grants, or resident tuition."

In accordance with section 59-101-430 of the SC Code of Laws, also known as the South Carolina Illegal Immigration Reform Act, the Clemson University Board of Trustees hereby institutes the following process:

### I. PROCESS

All applicants to Clemson University are required to verify on their application whether they are a U.S. citizen, Permanent Legal Resident or will be lawfully present in the United States at the time of enrollment on some other grounds. Enrollment at Clemson University for both undergraduate and graduate students is conditioned upon verification of lawful presence in the United States.

South Carolina Code of Law section 59-101-430 prohibits Clemson University from independently verifying the status of any legal alien. An alien's status must be verified with the federal government. Therefore, Clemson University will use either the Student and Exchange Visitor Program (SEVIS), a Web-based technology that tracks and monitors schools and programs, students, exchange visitors and their dependents throughout the duration of approved participation with the U.S. education system, or the Systematic Alien Verification for Entitlements (SAVE) program, Homeland Security's online system of alien status determination or any federal source of information about lawful alien presence that becomes available to Clemson University.

The Board of Trustees delegates responsibility for administering the details of this process to the Provost and the Office of Academic Affairs.



## FINANCIAL INFORMATION

The annual State Appropriation Act imposes the general requirement that student fees be fixed by the University Board of Trustees. The act imposes two specific requirements on the board: (1) In fixing fees applicable to academic and general maintenance and operation costs, the board must maintain a minimum student fee not less than the fee charged the previous year. (2) In fixing fees applicable to residence hall rental, dining halls, laundry, infirmary, and all other personal subsistence expenses, the Board must charge students an amount sufficient to cover fully the cost of providing such facilities and services.

The tuition and fees for all students—full or part time and auditing—are available at [www.clemson.edu/cfo/student-financials/](http://www.clemson.edu/cfo/student-financials/). Satisfactory settlement of all expenses is a requirement for completing each semester's class registration, and no student is officially enrolled until all past due accounts have been satisfied. Financial aid cannot be used to satisfy balances forward from a prior academic year.

Currently enrolled students who expect to continue enrollment may make housing reservations by preregistering on-line during the spring semester at a time designated by the Housing Office.

New students who are offered on-campus housing accommodations must pay a nonrefundable \$100 housing application fee and a \$200 admission deposit. The admissions deposit is deducted from the amount otherwise due for the first semester expenses. (Note: Policies regarding priority to/offering of on-campus housing are subject to change.)

All College of Business and Behavioral Science majors, and other non-majors taking 3000- and 4000-level courses offered by the college, are required to pay a differential fee to fund significant infrastructure and program enhancements. Additional information about this fee is available at [business.clemson.edu/special/enhanced/enhanced\\_fees.htm](http://business.clemson.edu/special/enhanced/enhanced_fees.htm).

### TUITION AND FEES

Detailed tuition and fee information is available at [www.clemson.edu/cfo/student-financials/](http://www.clemson.edu/cfo/student-financials/). Note: A late payment fee will be assessed if fees are not satisfied by published deadlines.

#### Full-Time Fees

Students must be enrolled in 12 semester hours to pay full-time fees. Students enrolled in less than 12 hours or who drop below 12 hours may become ineligible for some student services, financial aid, or other programs.

#### Part-Time Fees

Students taking less than 12 semester credit hours will be charged according to the schedule at [www.clemson.edu/cfo/student-financials/](http://www.clemson.edu/cfo/student-financials/). These fees do not provide for admission to athletic events, concert series, and other such activities.

### Notice to Customers Making Payment by Check

If a check is mailed for payment, it may be converted into an electronic funds transfer (EFT). This means a copy of the check will be made and the account information will be used to debit the bank account electronically for the amount of the check. The debit from the bank account will usually occur within 24 hours and will be shown on the drawer's bank account statement. The original check will not be returned to the drawer. It will be destroyed, but Student Financial Services will retain a copy of it. If the EFT cannot be processed for technical reasons, the drawer authorizes the University to process the copy in place of the original check. If the EFT cannot be completed due to insufficient funds, the University may try twice more to make the transfer. A returned item fee of \$30 will be charged and collected by EFT.

### Returned Checks, EFTs, and Credit Card Payments

A check, EFT, or credit card given in payment of University expenses that is returned unpaid by the bank creates an indebtedness to the University.

Student Financial Services will re-present returned items for payment of academic fees. A \$30 fee will be charged for each returned item. If a check is returned or dishonored for any reason, the student's account may be debited electronically for the amount of the check plus the \$30 returned item fee.

If the item is returned to the University in a timely manner with no response from the student or drawer, a written request to disenroll the student will be made to the Registrar. If the request is approved, the percentage of refund will be applied to the debt. If the item is returned after the mid-point of the semester with no response, a decision will be made by the Director of Student Financial Services and the Registrar as to the effect of disenrollment. The University may restrict subsequent payment for academic and other fees by accepting only cash, certified checks, or money orders.

Any individual who uses a two-party check for payment of University expenses will be held responsible for that check if it is returned unpaid by the bank. Items used as payment for various University services such as meal plans, housing, etc., that are later returned unpaid by the bank, give the University the right to cancel such services and cause forfeiture of any refund.

Any returned items not collected by the above procedures may be turned over to a collection agency, the indebtedness reported to a credit bureau and collection fees will be added to the account. Transcripts and diplomas will be withheld pending payment, and the debt may be deducted from state income tax refunds.

Abuse of check payment privileges may result in the restriction of such privileges for an indefinite period of time based on the frequency and/or dollar amount, as determined by Student Financial Services.

### Past Due Accounts

Any indebtedness to the University that becomes past due, immediately jeopardizes the student's enrollment, and no such student will be permitted to re-enroll for an ensuing semester or summer term. Billing fees and/or collection fees may be added to the indebtedness. Further, any student who fails to pay all indebtedness, including collection fees, to the University may not be issued a transcript or diploma. Unresolved debts may be turned over to a collection agency, reported to a credit bureau, and deducted from state income tax refunds. Debts include, but are not limited to, parking violations, library fines, rent, and academic fees.

### Refund of Academic Fees

(Tuition, University Fee, and Health Fee) for Students Withdrawing, Dropping to Part Time, or Part-Time Students Dropping Credit Hours

No refunds will be made on a semester's tuition and fees after four weeks from the last day to register. In the case of a withdrawal from the University, refunds will be based on the effective date of the withdrawal. In the case of a withdrawal from a course, refunds will be based on the date the student drops the course using the on-line registration system. To be eligible for a refund, the student's request must be received by Student Financial Services prior to the beginning of the next fall/spring semester or subsequent summer term. Beginning with the day following the last day to register, refunds for periods of four weeks or less during fall/spring semester shall be made on the following basis. Students receiving Title IV Financial Aid follow a different policy.

#### Fall/Spring Semester

Period of Enrollment	Percent Refund
Registration day(s) in published calendar	100%
After last day to register:	
One week or less	80%
More than 1 but not more than 2 weeks	60%
More than 2 but not more than 3 weeks	40%
More than 3 but not more than 4 weeks	20%
More than 4 weeks	0%

#### Summer Sessions

Period of Enrollment	Length of Session Percent Refund			
	Less Than 3 wks.	3 wks.	5 or 6 wks.	More Than 6 wks.
Registration day(s) in published calendar	100%	100%	100%	100%
After last day to register:				
One week or less	0%	40%	60%	60%
More than 1 but not more than 2 weeks	0%	0%	20%	40%
More than 2 but not more than 3 weeks	0%	0%	0%	20%
More than 3 weeks	0%	0%	0%	0%

### Refund of Dining Hall Fees

See the section on Dining on page 22.

## Cancellations of the Housing Contract for All New Students

### Cancellation of the Contract Prior to July 31, 2014

Students who sign contracts after July 31, 2014 are subject to all cancellation procedures and charges outlined below.

If cancellation request is received by the Housing Office on or before this date, the contract is cancelled with no additional charge. New freshman may only use this option if commuting from home [living with parent/guardian(s)] and only within a 50-mile radius of campus.

### Cancellation of the Contract After July 31, 2014

(a) The contract may be terminated after July 31, 2014 for the following reasons: withdrawal from school; marriage (no more than four weeks prior to the wedding date); or, circumstances determined by the University to be sufficiently extenuating as to warrant cancellation (documentary evidence will be required).

(b) Student bills, for students qualifying for cancellation under paragraph 5(a), will be adjusted appropriately based on the current Housing cancellation fee schedule and the circumstances of cancellation.

### Appeals Committee

Please go to the Clemson Home homepage and follow the navigation to the Appeals Process for forms and instructions.

### Cancellation of the Contract Prior to the Start of the Academic Year for All Continuing Students and Former Students Returning

#### Cancellation of the Contract Prior to April 15, 2014

(a) **April 15, 2014**—If cancellation request is received by the Housing Office on or before this date, the contract is cancelled without charge.

Students who sign contracts after April 15, 2014 are subject to all cancellation procedures and charges outlined below.

(b) **April 16 to April 30, 2014**—If cancellation request is received by the Housing Office on or between these dates, the contract is cancelled, and a \$500 contract cancellation charge is placed on the student's University account.

(c) In all cases where the student fails to enroll, a \$150 contract cancellation charge is placed on the student's University account. If a student re-enrolls after canceling, the full rental charge will be added back to the student's account. The \$150 cancellation charge is waived only in cases where the University denies re-admission.

#### Cancellation of the Contract after April 30, 2014

(a) The contract may be terminated for the following reasons: withdrawal from school; marriage (no more than four weeks prior to the wedding date); or, circumstances determined by the University to be sufficiently extenuating as to warrant cancellation (documentary evidence will be required). If student fails to provide sufficient cancellation documentation, the full amount of rent will be charged to the student if cancelled after May 1, 2014.

(b) Any bill, for students qualifying for cancellation under paragraph 5(a), will be adjusted appropriately based on the current Housing cancellation fee schedule and the circumstances of cancellation.

### Appeals Committee

Students are encouraged first to contact the Assignments Office with concerns regarding the contract cancellation process. If the concerns are not resolved satisfactorily, the student is encouraged to submit such concerns to the Appeals Committee.

### Proper Notice of Cancellation Request

Students who desire to request cancellation of this contract must contact University Housing at (864) 656-2295 or [clemsonhome@clemson.edu](mailto:clemsonhome@clemson.edu) for instructions.

## Refunds of Financial Aid for Students Withdrawing from the University

Refunds of academic fees are made in accordance with semester and summer session refund policies. University housing refunds are made according to the policy above. Meal plan refunds are made on a pro rata basis.

Since financial aid is expected to meet or help meet educational costs, any academic fee, housing, or meal plan fee for students withdrawing from the University up to the amount of financial aid received for that semester or summer session, will be refunded to the Financial Aid Program(s) from which the student received assistance.

Students receiving Title IV Funds (Federal Pell Grant, Federal SEOG, Federal Perkins, Federal Direct Loans—unsub or sub) or Federal PLUS Loans who withdraw from the University are subject to the Return of Title IV Funds regulations. Students with funds from any of these programs earn their financial aid dollars while enrolled. If a student withdraws prior to completing more than 60% of a term, a prorated portion of the federal financial aid dollars must be considered unearned and returned to the federal programs and could cause students to owe the University a significant amount upon withdrawal.

In addition to the amount of federal aid that Clemson must return, students who received financial aid for other educational costs, including off-campus living expenses, may be required to repay a portion of those funds to the federal programs. Failure to return aid owed to the federal aid programs may result in loss of eligibility for federal aid assistance.

Federal aid funds to be returned are distributed to the programs in the following order:

- Unsubsidized Federal Direct Loan
- Subsidized Federal Direct Loan
- Federal Perkins Loan
- Federal PLUS Loan
- Federal Pell Grant
- Federal SEOG
- Other Title IV Programs
- Non-Title IV Programs

After the refund has been applied to the Title IV and non-Title IV programs, any refund balance will be refunded to the student.

If debts were incurred before withdrawing, such as bad checks, unpaid traffic or library fines, etc., the refund will cover these obligations first. Academic fees, housing, and meal plan refunds for students withdrawing will be paid to the student.

## RESIDENT TUITION AND FEES

### Application for Resident Status

Any undergraduate student or prospective student whose status concerning entitlement to payment of in-state tuition and fees is uncertain has the responsibility of securing a ruling from the University by providing all relevant information on special application forms. These forms can be obtained online, and are to be completed and returned to that office prior to the first day of class for any semester or summer term for which the student is attempting to qualify for payment of the in-state tuition and fee rate. For more information, visit [clemson.edu/financial-aid/residency/index.html](http://clemson.edu/financial-aid/residency/index.html).

### Entitlement

Eligibility for payment of in-state tuition and fees shall be determined under the provisions of Sections 59-112-10 through 59-112-100, South Carolina Code of Laws, 1976, as amended. This law is set forth in its entirety as follows (subject to further amendment by the General Assembly).

### Statutes

**59-112-10—Definitions.** As used in this chapter:

A. The words "State Institution" shall mean those post-secondary educational institutions under the jurisdiction of the following: (1) Board of Trustees, Clemson University; (2) Board of Trustees, Medical University of South Carolina; (3) Board of Trustees, South Carolina State College; (4) State College Board of Trustees; (5) Board of Visitors, The Citadel; (6) Board of Trustees, University of South Carolina; (7) Board of Trustees, Winthrop University; and (8) State Board of Technical and Comprehensive Education.

B. The word "student" shall mean any person enrolled for studies in any state institution.

C. The word "residence" or "reside" shall mean continuous and permanent physical presence within this State, provided, that temporary absences for short periods of time shall not affect the establishment of a residence.

D. The word "domicile" shall mean a person's true, fixed, principal residence and place of habitation; it shall indicate the place where such person intends to remain, and to which such person expects to return upon leaving without establishing a new domicile in another state. For purposes of this section one may have only one legal domicile; one is presumed to abandon automatically an old domicile upon establishing a new one. Housing provided on an academic session basis for students at State institutions shall be presumed not to be a place of principal residence, as residency in such housing is by nature temporary.

E. The words "in-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are domiciled in South Carolina in accordance with this act; the words "out-of-state rates" shall mean charges for tuition and fees established by State Institutions for persons who are not domiciled in South Carolina in accordance with this act.

F. The words “independent person” shall mean a person in his majority, or an emancipated minor, whose predominant source of income is his own earnings or income from employment, investments, or payments from trusts, grants, scholarships, loans, or payments of alimony or separate maintenance made pursuant to court order.

G. The words “dependent” or “dependent person” mean: (1) one whose financial support is provided not through his own earnings or entitlements, but whose predominant source of income or support is payments from a parent, spouse, or guardian, and who qualifies as a dependent or an exemption on the federal tax return of the parent, spouse, or guardian; or (2) one for whom payments are made, under court order, for child support and the cost of his college education by an independent person meeting the provisions of Section 59-112-20 A or B. However, the words “dependent” or “dependent person” do not include a spouse or former spouse who is the recipient of alimony or separate maintenance payments made pursuant to court order.

H. The word “minor” shall mean a person who has not attained the age of eighteen years; and the words “emancipated minor” shall mean a minor whose parents have entirely surrendered the right to the care, custody and earnings of such minor and are no longer under any legal obligation to support or maintain such minor.

I. The word “parent” shall mean a person’s natural or adoptive father or mother; or if one parent has custody of the child, the parent having custody; or if there is a guardian or other legal custodian of such person, then such guardian or legal custodian; provided, however, that where circumstances indicate that such guardianship or custodianship was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or dependent person, it shall not be given such effect.

J. The word “spouse” shall mean the husband or wife of a married person.

**59-112-20—South Carolina Domicile Defined for Purposes of Rates of Tuition and Fees.** South Carolina domicile for tuition and fee purposes shall be established as follows in determinations of rates of tuition and fees to be paid by students entering or attending State Institutions:

A. Independent persons who reside in and have been domiciled in South Carolina for a period of no less than twelve months with an intention of making a permanent home herein, and their dependents, may be considered eligible for in-state rates.

B. Independent persons who reside in and have been domiciled in South Carolina for fewer than twelve months but who have full-time employment in the State, and their dependents, may be considered eligible for in-state rates for as long as such independent person is employed on a full-time basis in the State.

C. Where an independent person meeting the provisions of Section 59-112-20 B above, is living apart from his spouse, or where such person and his spouse are separated or divorced, the spouse and dependents of such independent person shall have domiciliary status for tuition and fee purposes only under the following circumstances: (1) if the spouse requesting domiciliary status for tuition and fee purposes remains domiciled in South Carolina although living apart or separated from his or her

employed spouse, (2) if the dependent requesting domiciliary status for tuition and fee purposes is under the legal custody or guardianship, as defined in Section 59-112-10I above, of an independent person who is domiciled in this State; or if such dependent is claimed as an income tax exemption by the parent not having legal custody but paying child-support, so long as either parent remains domiciled in South Carolina.

D. The residence and domicile of a dependent minor shall be presumed to be that of the parent of such dependent minor.

**59-112-30—Effect of Change of Residency.** When the domicile of a student or of the person upon whom a student is financially dependent changes after enrollment at a State Institution, tuition charges shall be adjusted as follows:

A. Except as provided in Section 59-112-20B above, when domicile is taken in South Carolina, a student shall not become eligible for in-state rates until the beginning of the next academic session after expiration of twelve months from date of domicile in this State.

B. When South Carolina domicile is lost, eligibility for in-state rates shall end on the last day of the academic session in which the loss occurs; however, application of this subsection shall be at the discretion of the institution involved.

C. Notwithstanding the other provisions of this section, any dependent person who has been domiciled with his family in South Carolina for a period of not less than three years immediately prior to his enrollment may enroll in a state-supported institution of higher learning at the in-state rate and may continue to be enrolled at such rate even if the parent, spouse, or guardian upon whom he is dependent moves his domicile from this State.

**59-112-40—Effect of Marriage.** Except as provided in Section 59-112-20 above, marriage shall affect determinations of domicile for tuition and fee purposes only insofar as it operates to evince an intention by the parties to make a permanent home in South Carolina.

**59-112-50—Military Personnel and Their Dependents.** Notwithstanding other provisions of this act, during the period of their assignment to duty in South Carolina members of the armed services of the United States stationed in South Carolina and their dependents may be considered eligible for in-state rates. When such armed service personnel are ordered away from the State, their dependents may continue for an additional twelve months to have this eligibility at the State Institutions where they are enrolled at the time such assignment ends. Such persons and their dependents may be considered eligible for in-state rates for a period of twelve months after their discharge from the armed services even though they were not enrolled at a State Institution at the time of their discharge, if they have evinced an intent to establish domicile in South Carolina and if they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge.

**59-112-60—Faculty, Administrative Employees and Dependents Thereof.** Full-time faculty and administrative employees of State Institutions, and the spouses and children of such persons, shall be excluded from the provision of this act.

**59-112-70—Abatement of Rates for Nonresidents on Scholarship.** Notwithstanding other provisions of this act, the governing boards listed in Section 59-112-10A above, are authorized to adopt policies for the abatement of any part or all of the out-of-state rates for students who are recipients of scholarship aid.

**59-112-80—Administration of Chapter; Burden of Proving Eligibility of Students.** Each State Institution shall designate an official to administer the provisions of this act. Students making application to pay tuition and fees at in-state rates shall have the burden of proving to the satisfaction of the aforesaid officials of State Institutions that they have fulfilled the requirements of this act before they shall be permitted to pay tuition and fees at such rate.

**59-112-90—Penalties for Willful Misrepresentation.** Where it appears to the satisfaction of officials charged with administration of these provisions that a person has gained domiciliary status improperly by making or presenting willful misrepresentations of fact, such persons should be charged tuition and fees past due and unpaid at the out-of-state rate, plus interest at a rate of eight percent per annum, plus a penalty amounting to twenty-five percent of the out-of-state rate for one semester; and until these charges have been paid no such student shall be allowed to receive transcripts or graduate from any State Institution.

**59-112-100—Regulations.** The Commission on Higher Education may prescribe uniform regulations for application of the provisions of this act and may provide for annual review of such regulations.

## ARTICLE V

### Determination of Rates of Tuition and Fees

(Statutory Authority: 1976 Code Sections 59-112-10 to 59-112-100)

#### 62-600. Rates of Tuition and Fees.

A. Resident classification is an essential part of tuition and fee determination, admission regulations, scholarship eligibility, and other relevant policies of the state. It is important that institutions have fair and equitable regulations that can be administered consistently and are sensitive to the interests of both students and the state. The Commission on Higher Education hereby establishes regulations for the Statute Governing Residency for Tuition and Fee Purposes to be applied consistently by all South Carolina institutions of higher education. These regulations do not address residency matters relating to in county categories used within the State’s technical colleges.

B. Institutions of higher education are required by the Statute to determine the residence classification of applicants. The initial determination of one’s resident status is made at the time of admission. The determination made at that time, and any determination made thereafter, prevails for each subsequent semester until information becomes available that would impact the existing residency status and the determination is successfully challenged. The burden of proof rests with the students to show evidence as deemed necessary to establish and maintain their residency status.

**62-601. Code of Laws Governing Residence.**

Rules regarding the establishment of legal residence for tuition and fee purposes for institutions of higher education are governed by Title 59, Chapter 112 of the 1976 South Carolina Code of Laws, as amended.

**62-602. Definitions.**

A. "Academic Session" is defined as a term or semester of enrollment. (62-607.B)

B. "Continue to be Enrolled" is defined as continuous enrollment without an interruption that would require the student to pursue a formal process of readmission to that institution. Formal petitions or applications for change of degree level shall be considered readmissions. (62-607.A)

C. "Dependent Person" is defined as one whose predominant source of income or support is from payments from a parent, spouse, or guardian, who claims the dependent person on his/her federal income tax return. In the case of those individuals who are supported by family members who do not earn enough reportable income for taxation purposes, a dependent person can be defined as one who qualifies as a dependent or exemption on the federal income tax return of the parent, spouse, or guardian. A dependent person is also one for whom payments are made, under court order, for child support and the cost of the dependent person's college education. A dependent person's residency is based upon the residency of the person upon whom they are dependent. (62-602.G) (62-602.N) (62-603.B) (62-605.C) (62-607.A)

D. "Domicile" is defined as the true, fixed, principal residence and place of habitation. It shall indicate the place where a person intends to remain, or to where one expects to return upon leaving without establishing a new domicile in another state. For purposes of this section, one may have only one legal domicile. One is presumed to abandon automatically an old domicile upon establishing a new one. Housing provided on an academic session basis for student at institutions shall be presumed not to be a place of principal residence, as residency in such housing is by its nature temporary. (62-602.E) (62-602.K) (62-602.M) (62-602.N) (62-603.A) (62-603.B) (62-605.B) (62-605.C) (62-607.A) (62-607.B) (62-608.A) (62-608.C) (62-608.D) (62-609.A.3) (62-609.A.4)

E. "Family's Domicile in this State is Terminated" is defined as an employer directed transfer of the person upon whom the student is dependent and is not construed to mean a voluntary change in domicile. Also included is a relocation of the person upon whom the student is dependent who is laid off through no fault of their own, e.g., plant closure, downsizing, etc., who accepts employment in another state prior to relocating. (62-607.A)

F. "Full time employment" is defined as employment that consists of at least thirty seven and one half hours a week on a single job in a full time status, with gross earnings of at least minimum wage. However, a person who works less than thirty seven and one half hours a week but receives or is entitled to receive full time employee benefits shall be considered to be employed full time if such status is verified by the employer. A person who meets the eligibility requirements of the Americans with Disabilities Act must present acceptable evidence that they satisfy their prescribed employment specifications in order to qualify as having full time employment. (62-605.C.1) (62-609.A.2) (62-609.A.3)

G. "Guardian" is defined as one legally responsible for the care and management of the person or property of a minor child based upon the five tests for dependency prescribed by the Internal Revenue Service; provided, however, that where circumstances indicate that such guardianship or custodianship was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or dependent person, it shall not be given such effect. (62-602.C) (62-602.E) (62-602.I) (62-602.M) (62-603.B) (62-605.C)

H. "Immediately Prior" is defined as the period of time between the offer of admission and the first day of class of the term for which the offer was made, not to exceed one calendar year. (62-607.A)

I. "Independent Person" is defined as one in his/her majority (eighteen years of age or older) or an emancipated minor, whose predominant source of income is his/her own earnings or income from employment, investments, or payments from trusts, grants, scholarships, commercial loans, or payments made in accordance with court order. An independent person must provide more than half of his or her support during the twelve months immediately prior to the date that classes begin for the semester for which resident status is requested. An independent person cannot claim the domicile of another individual as their own for the purposes of establishing intent to become a South Carolina resident. An independent person must have established his/her own domicile for twelve months prior to receiving in-state tuition and fees. An independent person cannot be claimed as a dependent or exemption on the federal tax return of his or her parent, spouse, or guardian for the year in which resident status is requested. (62-602.N) (62-603.A) (62-605.C) (62-607.B) (62-608.B)

J. "Minor" is defined as a person who has not attained the age of eighteen years. An "emancipated minor" shall mean a minor whose parents have entirely surrendered the right to the care, custody and earnings of such minor and are no longer under any legal obligation to support or maintain such minor. (62-602.C)

K. "Non-resident Alien" is defined as a person who is not a citizen or permanent resident of the United States. By virtue of their non-resident status "non-resident aliens" generally do not have the capacity to establish domicile in South Carolina. (62-602.M) (62-604.A)

L. "Parent" is defined as the father, mother, stepfather, stepmother, foster parent or parent of a legally adopted child. (62-602.C) (62-602.E) (62-602.I) (62-602.J) (62-602.M) (62-603.B) (62-603.C) (62-605.C)

M. "Reside" is defined as continuous and permanent physical presence within the State, provided that absences for short periods of time shall not affect the establishment of residence. Excluded are absences associated with requirements to complete a degree, absences for military training service, and like absences, provided South Carolina domicile is maintained. (62-603.A) (62-606.B) (62-609.A) (62-609.A.3) (62-609.A.4) (62-609.B)

N. "Resident" for tuition and fee purposes is defined as an independent person who has abandoned all prior domiciles and has been domiciled in South Carolina continuously for at least twelve months immediately preceding the first day of class of the term for which resident classification is sought and for whom there is an absence of domiciliary evidence

in other states or countries, notwithstanding other provisions of the Statute. (62-600.A) (62-600.B) (62-602.I) (62-602.K) (62-602.M) (62-603.A) (62-603.B) (62-603.C) (62-604.A) (62-605.A) (62-605.C) (62-605.C.7) (62-606.A) (62-606.A.5) (62-606.B) (62-607.A) (62-608.B) (62-609.A.3) (62-610.A) (62-610.B) (62-611.A) (62-611.B)

O. "Spouse" is defined as the husband or wife of a married person in accordance with Title 20, Chapter 1 of the 1976 South Carolina Code of Laws, as amended. (62-602.C) (62-602.E) (62-602.I) (62-602.M) (62-603.B) (62-605.C)

P. "Temporary Absence" is defined as a break in enrollment during a fall or spring semester (or its equivalent) during which a student is not registered for class. (62-606.A)

Q. "Terminal Leave" is defined as a transition period following active employment and immediately preceding retirement (with a pension or annuity), during which the individual may use accumulated leave. (62-609.A.4)

R. "United States Armed Forces" is defined as the United States Air Force, Army, Marine Corps, Navy, and Coast Guard. (62-606.B) (62-609.A(1))

S. "Trust" is defined as a legal entity created by a grantor for the benefit of designated beneficiaries under the laws of the state and the valid trust instrument. However, that where circumstances indicate that such trust was created primarily for the purpose of conferring South Carolina domicile for tuition and fee purposes on such child or independent person, it shall not be given such effect.

**62-603. Citizens and Permanent Residents.**

A. Independent persons who have physically resided and been domiciled in South Carolina for twelve continuous months immediately preceding the date the classes begin for the semester for which resident status is claimed may qualify to pay in state tuition and fees. The twelve month residency period starts when the independent person establishes the intent to become a South Carolina resident per Section 62-605 entitled "Establishing the Requisite Intent to Become a South Carolina Domiciliary." The twelve month residency period cannot start until the absence of indicia in other states is proven. Absences from the State during the twelve month period may affect the establishment of permanent residence for tuition and fee purposes.

B. The resident status of a dependent person is based on the resident status of the person who provides more than half of the dependent person's support and claims or, only in the case of those individuals who are supported by family members who do not earn enough reportable income for taxation purposes, qualifies to claim the dependent person as a dependent for federal income tax purposes. Thus, the residence and domicile of a dependent person shall be presumed to be that of their parent, spouse, or guardian.

C. In the case of divorced or separated parents, the resident status of the dependent person may be based on the resident status of the parent who claims the dependent person as a dependent for tax purposes; or based on the resident status of the parent who has legal custody or legal joint custody of the dependent person; or based on the resident status of the person who makes payments under a court order for child support and at least the cost of his/her college tuition and fees.

**62-604. Non-Resident Aliens, Non-Citizens, and Non-Permanent Residents.**

A. Except as otherwise specified in this section or as provided in Section 62-609 (1) & (2), independent non-citizens and non-permanent residents of the United States will be assessed tuition and fees at the non-resident, out of state rate. Independent non-resident aliens, including refugees, asylees, and parolees may be entitled to resident, in state classification once they have been awarded permanent resident status by the U.S. Department of Justice and meet all the statutory residency requirements provided that all other domiciliary requirements are met. Time spent living in South Carolina immediately prior to the awarding of permanent resident status does not count toward the twelve month residency period. Certain non resident aliens present in the United States in specified visa classifications are eligible to receive in state residency status for tuition and fee purposes as prescribed by the Commission on Higher Education. They are not, however, eligible to receive state sponsored tuition assistance/scholarships.

B. Title 8 of the Code of Federal Regulations (CFR) serves as the primary resource for defining visa categories.

**62-605. Establishing the Requisite Intent to Become a South Carolina Domiciliary.**

A. Resident status may not be acquired by an applicant or student while residing in South Carolina for the primary purpose of enrollment in an institution or for access to state supported programs designed to serve South Carolina residents. An applicant or student from another state who comes to South Carolina usually does so for the purpose of attending school. Therefore, an applicant or student who enrolls as a non-resident in an institution is presumed to remain a non-resident throughout his or her attendance and does not qualify under any of the residency provisions.

B. If a person asserts that his/her domicile has been established in this State, the individual has the burden of proof. Such persons should provide to the designated residency official of the institution to which they are applying any and all evidence the person believes satisfies the burden of proof. The residency official will consider any and all evidence provided concerning such claim of domicile, but will not necessarily regard any single item of evidence as conclusive evidence that domicile has been established.

C. For independent persons or the parent, spouse, or guardian of dependent persons, examples of intent to become a South Carolina resident may include, although any single indicator may not be conclusive, the following indicia:

- (1) Statement of full time employment;
- (2) Designating South Carolina as state of legal residence on military record;
- (3) Possession of a valid South Carolina driver's license, or if a non-driver, a South Carolina identification card. Failure to obtain this within 90 days of the establishment of the intent to become a South Carolina resident will delay the beginning date of residency eligibility until a South Carolina driver's license is obtained;
- (4) Possession of a valid South Carolina vehicle registration card. Failure to obtain this within 45 days of the establishment of the intent to become a South Carolina resident will delay the beginning date of residency eligibility until the applicant obtains a South Carolina vehicle registrations card;

- (5) Maintenance of domicile in South Carolina;
- (6) Paying South Carolina income taxes as a resident during the past tax year, including income earned outside of South Carolina from the date South Carolina domicile was claimed;
- (7) Ownership of principal residence in South Carolina; and
- (8) Licensing for professional practice (if applicable) in South Carolina.

D. The absence of indicia in other states or countries is required before the student is eligible to pay in state rates.

**62-606. Maintaining Residence.**

A. A person's temporary absence from the State does not necessarily constitute loss of South Carolina residence unless the person has acted inconsistently with the claim of continued South Carolina residence during the person's absence from the State. The burden is on the person to show retention of South Carolina residence during the person's absence from the State. Steps a person should take to retain South Carolina resident status for tuition and fee purposes include:

- (1) Continuing to use a South Carolina permanent address on all records;
- (2) Maintaining South Carolina driver's license;
- (3) Maintaining South Carolina vehicle registration;
- (4) Satisfying South Carolina resident income tax obligation. Individuals claiming permanent residence in South Carolina are liable for payment of income taxes on their total income from the date that they established South Carolina residence. This includes income earned in another state or country.

B. Active duty members of the United States Armed Forces and their dependents are eligible to pay in state tuition and fees as long as they continuously claim South Carolina as their state of legal residence during their military service. Documentation will be required in all cases to support this claim. South Carolina residents who change their state of legal residence while in the military lose their South Carolina resident status for tuition and fee purposes.

**62-607. Effect of Change of Residency.**

A. Notwithstanding other provisions of this section, any dependent person of a legal resident of this state who has been domiciled with his/her family in South Carolina for a period of not less than three years and whose family's domicile in this state is terminated immediately prior to his/her enrollment may enroll at the in state rate. Any dependent person of a legal resident of this state who has been domiciled with his/her family in South Carolina for a period of not less than three years and whose family's domicile in this state is terminated after his/her enrollment may continue to receive in state rates, however, a student must continue to be enrolled and registered for classes (excluding summers) in order to maintain eligibility to pay in state rates in subsequent semesters. Transfers within or between South Carolina colleges and universities of a student seeking a certificate, diploma, associate, baccalaureate, or graduate level degree does not constitute a break in enrollment.

B. If a dependent or independent person voluntarily leaves the state, and information becomes available that would impact the existing residency status, eligibility for in state rates shall end on the last day of

the academic session during which domicile is lost. Application of this provision shall be at the discretion of the institution involved. However, a student must continue to be enrolled and registered for classes (excluding summers) in order to maintain eligibility to pay in state rates in subsequent semesters.

**62-608. Effect of Marriage.**

A. In ascertaining domicile of a married person, irrespective of gender, such a review shall be determined just as for an unmarried person by reference to all relevant evidence of domiciliary intent.

B. If a non-resident marries a South Carolina resident, the non-resident does not automatically acquire South Carolina resident status. The non-resident may acquire South Carolina resident status if the South Carolina resident is an independent person and the non-resident is a dependent of the South Carolina resident.

C. Marriage to a person domiciled outside South Carolina shall not be solely the reason for precluding a person from establishing or maintaining domicile in South Carolina and subsequently becoming eligible or continuing to be eligible for residency.

D. No person shall be deemed solely by reason of marriage to a person domiciled in South Carolina to have established or maintained domicile in South Carolina and consequently to be eligible for or to retain eligibility for South Carolina residency.

**62-609. Exceptions.**

A. Persons in the following categories qualify to pay in state tuition and fees without having to establish a permanent home in the state for twelve months. Persons who qualify under any of these categories must meet the conditions of the specific category on or before the first day of class of the term for which payment of in state tuition and fees is requested. The following categories apply only to in state tuition and do not apply to State supported scholarships and grants. Individuals who qualify for in state tuition and fees under the following exceptions do not automatically qualify for LIFE, SC HOPE or Palmetto Fellows Scholarships.

- (1) "Military Personnel and their Dependents": Members of the United States Armed Forces who are permanently assigned in South Carolina on active duty and their dependents are eligible to pay in state tuition and fees. When such personnel are transferred from the State, their dependents may continue to pay in state tuition and fees as long as they are continuously enrolled. Such persons (and their dependents) may also be eligible to pay in state tuition and fees as long as they are continuously enrolled after their discharge from the military, provided they have demonstrated an intent to establish a permanent home in South Carolina and they have resided in South Carolina for a period of at least twelve months immediately preceding their discharge. Military personnel who are not stationed in South Carolina and/or former military personnel who intend to establish South Carolina residency must fulfill the twelve month "physical presence" requirement for them or their dependents to qualify to pay in state tuition and fees.
- (2) "Faculty and Administrative Employees with Full Time Employment and their Dependents": Full time faculty and administrative employees of South Carolina state supported colleges and universities and their dependents are eligible to pay in state tuition and fees.

(3) "Residents with Full Time Employment and their Dependents:" Persons who reside, are domiciled, and are full time employed in the State and who continue to work full time until they meet the twelve month requirement and their dependents are eligible to pay in state tuition and fees, provided that they have taken steps to establish a permanent home in the State. Steps an independent person must take to establish residency in South Carolina are listed in Section 62-605 entitled ("Establishing the Requisite Intent to Become a South Carolina Domiciliary"). (4) "Retired Persons and their Dependents:" Retired persons who are receiving a pension or annuity who reside in South Carolina and have been domiciled in South Carolina as prescribed in the Statute for less than a year may be eligible for in state rates if they maintain residence and domicile in this State. Persons on terminal leave who have established residency in South Carolina may be eligible for in state rates even if domiciled in the State for less than one year if they present documentary evidence from their employer showing they are on terminal leave. The evidence should show beginning and ending dates for the terminal leave period and that the person will receive a pension or annuity when he/she retires.

B. South Carolina residents who wish to participate in the Contract for Services program sponsored by the Southern Regional Education Board must have continuously resided in the State for other than educational purposes for at least two years immediately preceding application for consideration and must meet all other residency requirements during this two year period.

#### 62-610. Application for Change of Resident Status.

A. Persons applying for a change of resident classification must complete a residency application/petition and provide supporting documentation prior to a reclassification deadline as established by the institution.

B. The burden of proof rests with those persons applying for a change of resident classification who must show required evidence to document the change in resident status.

#### 62-611. Incorrect classification.

A. Persons incorrectly classified as residents are subject to reclassification and to payment of all nonresident tuition and fees not paid. If incorrect classification results from false or concealed facts, such persons may be charged tuition and fees past due and unpaid at the out of state rate. The violator may also be subject to administrative, civil, and financial penalties. Until these charges are paid, such persons will not be allowed to receive transcripts or graduate from a South Carolina institution.

B. Residents whose resident status changes are responsible for notifying the Residency Official of the institution attended of such changes.

#### 62-612. Inquiries and Appeals.

A. Inquiries regarding residency requirements and determinations should be directed to the institutional residency official.

B. Each institution will develop an appeals process to accommodate persons wishing to appeal residency determinations made by the institution's residency official. Each institutions appeal process should be directed by that institutions primary residency officer, in conjunction with those individuals

who practice the application of State residency regulations on a daily basis. The professional judgment of the residency officer and administrators will constitute the institutional appeal process. Neither the primary residency official nor appellate official(s) may waive the provisions of the Statute or regulation governing residency for tuition and fee purposes.

## DINING

The University provides a variety of meal plans to meet student needs. The meal plan dining halls, Harcombe, Schilletter, and Clemson House, are located in different areas of the campus and feature an all-you-care-to-eat policy per meal. Meals may also be purchased on a cash basis or by using a debit/credit card, Paw Points, or TigerStripe account. Meal Plans become effective when University housing is opened for occupancy at the beginning of each semester. Meal Plans expire after the evening meal on the day of graduation at the end of each semester. Meal Plans are not effective during official University breaks.

Eastside Food Court, Canteen, Fernow Street Café, Einstein Bros. Bagels, and Java City provide a wide assortment of dining selections on an a la carte basis. Nationally branded concepts are available in dining facilities on campus: Papa John's and Subway in the Eastside Food Court, Chick-fil-a in the Canteen, Pizza Hut Express in Fernow Street Café, Wendy's adjacent to Schilletter Dining Hall, and Chili's Too in the Johnstone Complex next to Harcombe Dining Hall. All retail dining facilities and dining halls accept cash, credit/debit, Paw Points, and TigerStripe.

All first-year students who live in University Housing, excluding apartments with kitchens (Clemson House does not fulfill the apartment exception), are required to subscribe to a first-year resident meal plan for their first two semesters. All other students may choose a meal plan on a semester basis or pay for individual meals. First-year students living in University housing (excluding the aforementioned housing) may terminate their meal plan for one of the following reasons ONLY:

- withdrawal from the University
- change in housing assignment to an apartment with kitchen facilities
- medical condition with dietary requirements that cannot be met by Dining Services. Documentation from a medical doctor must be provided along with specific dietary requirements. This documentation will be reviewed by the Dining Services Food Administrator
- other circumstances determined by the University to be beyond the student's control

First-year students must provide the necessary documentation for any of the above reasons before cancellation of their meal plan will be considered. Upperclassmen may terminate their meal plans for any reason on the prescribed dates listed below only. Failure to participate in a meal plan does not automatically release a student from the first-year student requirements listed above, all first-year students who live on campus are required to participate in one of the two meal plans listed above.

If a first-year student living on campus does not sign up for one of the required resident choices, a meal plan will be assigned. All meal plans for all meal plan participants will automatically rollover to the

spring semester. If an upperclassmen chooses to not to subscribe to a meal plan for the spring semester they must opt out before payment of the spring tuition statement.

Students may change meal plans at the Tiger 1 Card Office in 111 Hendrix Student Center during certain dates. Visit the University Housing and Dining Website for applicable dates. All adjustments will be prorated. Students may upgrade meal plans at anytime.

Meal plans cancelled for any reason after service of the first meal will result in a refund of advance payment, minus a \$35 termination charge, and a weekly charge for meals available. The meals available charge applies to the meals that have been prepared, not those that have been eaten by the individual student. Paw Points, which are associated with Plus plans, are not refundable; however, they do carry forward to the next semester. Students will be responsible for all service charges related to changes or termination of a meal plan. *Note:* Meal plans may not be shared with other students. Only the meal plan purchaser may utilize his/her meal plan.

Information is available at [www.clemson.edu/dining](http://www.clemson.edu/dining) or calling (864) 656-1237. More information is available at [www.tiger1.clemson.edu](http://www.tiger1.clemson.edu), by calling (864) 656-0763, or e-mailing [tiger1-L@clemson.edu](mailto:tiger1-L@clemson.edu)

## TIGERSTRIPE ACCOUNT

The TigerStripe account is equivalent to a prepaid debit card. As items are purchased from any of the more than 200 locations that accept TigerStripe, both on and off campus, the amount spent is deducted from the TigerStripe account balance. All students are eligible. Funds may be added to the account via the on-line TigerOne Card Services Office at: [online.clemson.edu](http://online.clemson.edu). Students may also pay in person at the TigerOne Card Services Office with cash, check, or credit card; or they may call (864) 656-0763 to pay with American Express, Discover, MasterCard or Visa. Office hours are Monday-Friday, 8:00 a.m.-4:30 p.m. TigerStripe accounts are non-refundable except for students withdrawing, graduating, or not returning to the University. TigerStripe cannot be used for the payment of tuition; however, when paying tuition, students may add up to \$2,500 to their TigerStripe account. Transactions are limited to \$250 per day in the Student Financial Services Office for the payment of incidental fees. Credit balances at the end of each semester will carry forward to the next term. (Students withdrawing must go to E-103 Martin Hall. Balances greater than \$50 will be refunded.) Any indebtedness to the University will be deducted from refunds. All graduating students are required to request a refund by emailing [tigerone-card@lists.clemson.edu](mailto:tigerone-card@lists.clemson.edu) two weeks prior to graduation. Any account that remains dormant for 18 months or longer will have the balance transferred to a University scholarship account.

More information is available at [clemson.edu/tigerone](http://clemson.edu/tigerone), or by calling (864) 656-0763, or e-mailing [tigerone-card@lists.clemson.edu](mailto:tigerone-card@lists.clemson.edu).

## FINANCIAL AID

The Office of Student Financial Aid administers and coordinates various types of undergraduate financial aid administered by Clemson University: scholarships, loans, grants, and work-study employment. The office works jointly with the University Scholarships and Awards Committee.

Students may apply after January 1 for financial assistance for the next academic year. Financial aid requests, based on financial need, must be supported by a processed Free Application for Federal Student Aid (FAFSA) and renewed annually. No application is required for the LIFE Scholarship.

The FAFSA must be submitted by April 1 for continuing students for need-based scholarships, Federal Supplemental Educational Opportunity Grant (FSEOG), Federal Work-Study, Federal Perkins Loan, and South Carolina State Need-Based Grant. April 1 is the suggested deadline for application for the Federal Pell Grant and the Federal Direct Loan. June 15 is the suggested deadline for application for private/alternative loans and the Federal PLUS Loan. PLUS and private loans require a separate online application.

Transfer students applying for student loans will be considered as entering freshmen in determining maximum loan limits. Following enrollment, after the credit evaluation process has been completed, students may submit a request for additional funds due to changes in class standing.

Information regarding financial aid programs at Clemson University is available at [www.clemson.edu/finaid](http://www.clemson.edu/finaid) or from the Office of Student Financial Aid, G-01 Sikes Hall, Box 345123, Clemson, SC 29634-5123.

### Satisfactory Academic Progress for Financial Aid Eligibility

Students must maintain satisfactory academic progress to be eligible for financial aid. This policy contains both qualitative (grade-point average) and quantitative (credit hours completed) requirements. Students must meet the grade-point average requirement as stated under the Academic Eligibility Policy, and must complete their degrees within 150% of the published time frame. Details are available at [www.clemson.edu/finaid](http://www.clemson.edu/finaid). Students wishing to appeal their academic progress status may submit a letter to the Office of Student Financial Aid. This appeals process is separate from the Appeals Committee on Academic Eligibility.

### Institutional Aid Policy for Suspended Students

An undergraduate student who has been suspended from the University for a violation of the Academic Integrity Policy, or suspended from the University due to a violation of any Student Regulation as defined and enforced by the Office of Community and Ethical Standards, becomes immediately ineligible for University merit or need-based scholarship or grant aid for the remainder of the student's undergraduate enrollment at Clemson.

### Educational Benefits for Veterans, War Orphans, and Children of Deceased or Disabled Law Enforcement Officers or Fire Fighters

The Veterans Administration provides educational assistance for veterans and children of deceased or totally disabled veterans who meet requirements of applicable laws and regulations. Any veteran or child of a deceased or totally disabled veteran should communicate with the nearest Veterans Administration Office to determine whether he/she is entitled to any educational benefits. Free tuition is available to children of South Carolina law enforcement officers or fire fighters who were totally disabled or killed in the line of duty. Certification is required from the agency of the parent's employment. Upon presentation of proof of eligibility, a student shall not become eligible for educational assistance until the beginning of the next academic term.

### Educational Benefits for Senior Citizens

South Carolina residents who are at least 60 year of age may qualify for free tuition. Applicants may obtain a waiver application and an audit card (if auditing courses) from the Registrar's Office in 102 Sikes Hall. Seniors submit the waiver application and a photocopy of their SC driver's license to the Office of Student Financial Aid in G-01 Sikes Hall. Seniors who are auditing courses must submit an audit card to 102 Sikes Hall each semester. The waiver application must be submitted prior to the first day of class and is not retroactive to prior terms. Questions may be directed to the Office of Student Financial Aid at (864) 656-2280.

# STUDENT SERVICES

## HOUSING

### Single Student Housing

University Housing provides a “home away from home” for approximately 6,300 single students in 24 residence halls, and three apartment complexes. Most rooms are double occupancy, but there are a limited number of single rooms available. Most two-bedroom apartments accommodate four students. All University housing is equipped to meet the needs of today’s college student. Approximately two weeks after acceptance to the University, housing information will be mailed to the students. Incoming freshmen should apply for on-campus housing at [www.clemson.edu/housing](http://www.clemson.edu/housing). Transfer students and former students returning are offered on-campus housing if space is available.

## REDFERN HEALTH CENTER

Redfern Health Center (RHC) is an integrated outpatient facility comprised of four divisions: Medical Services, Counseling and Psychological Services (CAPS), Health Promotion, and Healthy Campus. Hours of operation are Monday-Friday 8:00 a.m.-5:00 p.m., except Wednesday 9:00 a.m.-5:00 p.m. (summer and break hours, Monday-Friday 8:00 a.m.-4:30 p.m., except Wednesday 9:00 a.m.-4:30 p.m.)

### Medical Services

The student health center offers outpatient ambulatory care for illnesses and injury, pharmacy, lab, x-ray, and specialty clinics, including women’s health, orthopedic injury and allergy/immunization clinics. Students are seen on an appointment basis. Appointments can be made by calling the appointment line. Students without an appointment are seen in the Nurses Clinic.

Medical clearance is required for all students enrolled at the University. For information regarding immunization requirements, visit the Redfern Health Center Website at [www.clemson.edu/redfern](http://www.clemson.edu/redfern) and click on “Immunization Requirements.” An Interferon Gamma Release Assay (IGRA) screening is required for all students coming from countries identified as being high risk for tuberculosis by the U.S. Centers for Disease Control and Prevention (CDC). The IGRA screening must be done in the United States. TB screenings performed outside of the U.S. will not be accepted. Students not in compliance with immunization requirements will not be allowed to complete registration for the next semester and may be subject to a late fee.

### After Hours

Emergency 911 services are available after hours. Students with questions about their health care needs should call the NurseLine at 656-2233, option 2. A registered nurse is available by telephone to answer questions and offer advice about health care needs. Students requiring the care of a physician after hours can choose from area emergency rooms and urgent

care facilities, including Clemson Health Center (an urgent care facility), Oconee Medical Center, AnMed Health, Baptist Easley Hospital, and Greenville Memorial Hospital. Medical costs incurred are the student’s responsibility. Students should contact Redfern the next business day for follow-up care.

The University ambulance transports on-campus medical emergencies to the closest community medical resource. The University ambulance is staffed with licensed emergency medical personnel 24 hours a day. Students are required to pay for off-campus ambulance transportation.

## Counseling and Psychological Services (CAPS)

CAPS provides comprehensive mental health services from a holistic perspective. Students are seen within their context and developmental stages as psychotherapy/counseling is delivered in individual, group, or couples format. Specialized services are delivered by a psychiatrist, registered dietician, and addictions counselors. All services are confidential.

CAPS offers a walk-in clinic Monday through Friday, from 10:00 a.m.-2:30 p.m. for the initial access to services. Students complete paperwork and are seen for this initial brief evaluation on a first-come, first-served basis. Students who cannot meet the walk-in clinic times may call 656-2451 for an appointment during the 8:00 a.m.-6:00 p.m. hours of operation.

The Assessment, Choices, Transitions and Training (ACTT) Program assists students with substance misuse/abuse concerns. CAPS also provides counseling, advocacy, referral, education, and support services for students with concerns about relationship and sexual violence. Students with eating concerns/disorders are treated from a multidisciplinary approach that involves psychological, medical and nutritional perspectives. CAPS conducts a limited number of psychological evaluations for learning disabilities and attention disorders on a first-come, first-served basis each semester.

In case of emergency, assistance and consultation are available by calling 656-2451 during regular business hours. After hours and on weekends, the on-call counselor can be reached through the University Police Department at 656-2222.

## Health Promotion

The Health Promotion Office provides health information and resources to students in the student health center, on Redfern’s Web site, and through the electronic health record system (Point n Click). Face-to-face consultation is provided about a variety of health concerns, such as nutrition, tobacco cessation, and sexual health, to individuals and groups of students. HIV counseling and testing is also available. Students are invited to participate in promoting healthy behaviors by joining the Student Health Advisory Committee (SHAC), which plans and organizes campus awareness events on sexual responsibility, tobacco use, nutrition, and HIV/AIDS, among other topics.

## Healthy Campus

Healthy Campus coordinates programs and initiatives through collaboration with campus and community partners to create a culture and/or environment that fosters health/wellness, safety and sustainability and enables our campus community members to achieve, learn and serve. Healthy Campus achieves this by providing exemplary:

- Leadership and advocacy for public health policies and structures intended to improve health
- Engaged learning activities; creative inquiry teams, internships, class projects
- Networks and partnerships of collaborators to achieve healthy campus objectives
- Population-level interventions

## Health Fee

University policy requires that all students registered for six or more credit hours on campus during the fall or spring semester or three or more on-campus credit hours during a summer session pay the University health fee. The health fee provides access to the professional service of physicians, nurse practitioners, psychologists, counselors, and health educators at no additional cost; reduced costs for medical diagnostics; and an after-hours urgent care excess insurance benefit. Students pay for pharmaceuticals, orthopedic equipment, specialty clinics, and psychological testing. Payment is expected at the time of service and may be made by cash, check, MasterCard, or TigerStripe.

## Health Insurance

The University offers a student health insurance plan to help cover major medical expenses. Information is available at [www.studentinsurance.com](http://www.studentinsurance.com). Students are strongly encouraged to have comprehensive health insurance coverage during their tenure at the University.

## ACADEMIC SUCCESS CENTER

The mission of the Academic Success Center (ASC) is to empower undergraduate students to achieve their academic goals by providing opportunities to enhance student learning, academic success and personal growth. The ASC serves as a catalyst to help achieve University goals by promoting high graduation rates, promoting excellence in advising, providing support systems to all students, and increasing freshmen retention. The ASC offers the following programs and services to all students at no charge:

- Supplemental Instruction (SI) allows students enrolled in historically difficult courses to work in a study group setting with peer leaders who have successfully completed the course and who have been trained to facilitate SI help sessions.
- Course specific tutoring is offered each week, Sunday through Friday, in a group setting on a walk-in basis. The ASC Tutor Request Policy allows students in need of tutoring for a course not listed in the tutoring or SI schedule to request a tutor.



- Academic Skills Workshops are held throughout the academic year to enhance the learning experience and build academic skills.
- One-on-one academic counseling sessions help students evaluate their study skills and develop strategies for academic success.
- Individual academic coaching sessions provide structure, support, and feedback to help students stay on course for success. The Academic Coach also coordinates Tiger Success, a program to help students on probation regain good academic standing at Clemson.

Students are encouraged to consult with the Student Disability Services staff as early as possible, preferably prior to the first day of classes. Current documentation of a specific disability from a licensed professional is needed. For additional information or to schedule an appointment, contact Student Disability Services at (864) 656-6848 or [sds1@clemson.edu](mailto:sds1@clemson.edu). Details on policies and procedures are available at [www.clemson.edu/sds](http://www.clemson.edu/sds).

## CAREER CENTER

The Michelin® Career Center, in the Center for Career & Professional Development, assists undergraduate and graduate students in selecting appropriate fields of study, furthering their education, learning effective job searching strategies, and making connections with employers.

Students can utilize a complete range of services and career development resources in the career resource center in both print and electronic formats. Career counselors are available to meet one-on-one with students to explore career or educational options, devise résumés and cover letters, hone interviewing techniques, conduct searches for internships and full-time jobs, and ready themselves for interviewing with employers. In addition, students may utilize ClemsonJobLink, the Career Center's on-line recruiting system, to view part-time jobs, internships, and full-time job postings and to sign up for on-campus interviews.

Experiential learning opportunities are designed to provide students with an experience in which they are required to be active and intentional learners. The goal is for students to transfer their knowledge and experiences from the classroom and apply them in work environments outside the classroom. The Michelin® Career Center's Internship Program is geared to bringing students and employers together to facilitate an academically viable and mutually beneficial work experience. This program offers zero-credit-hour internship courses (INT 1010 and INT 2010) for students in majors that do not offer internship credit. Students may participate in either part-time or full-time internships.

Major events sponsored by the Career Center include a fall and spring Career Fair and the University Placement/Recruitment for Educators Program (UPREP) Teacher Fair.

Other information can be obtained from the Career Center's website at [career.clemson.edu](http://career.clemson.edu) or by calling (864) 656-6000.

## DISABILITY SERVICES

Student Disability Services (SDS) coordinates the provision of reasonable accommodations for students with physical, psychological, attentional, or learning disabilities. Accommodations are individualized, flexible, and confidential based on the nature of the disability and the academic environment in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990.

# ACADEMIC REGULATIONS

Proper discharge of all duties is required at Clemson University, and a student's first duty is his/her scholastic work. All students should be thoroughly acquainted with these basic requirements.

## CREDIT SYSTEM

The semester hour is the basis of all credits. Generally, one recitation hour or two–three laboratory hours a week for a semester constitute a semester hour. Thus, in HIST 1930 Modern World History 3(3), as this subject is listed in the *Courses of Instruction* section of this catalog, the student takes three semester hours. When the course is completed satisfactorily, three credit hours are entered on the student's record. The notation "3(3)" means that the course carries three credits and has three clock hours of class time per week. CH 1010 General Chemistry 4(3) carries four semester hours, and has three clock hours of class time per week. However, CH 1010 has a required lab course associated with it (CH 1011), which carries no additional credit, but has three clock hours associated with it. CH 1011 would therefore read 0(3), and the three clock hours associated with CH 1011 account for the fourth credit CH 1010 carries.

## Credit Load

Except for an entering freshman, who is restricted to the curriculum requirements of his/her major, the credit load for an undergraduate must be approved by the academic advisor. The class advisor will approve a credit load deemed in the best interest of the student based on such factors as course requirements, grade-point average, participation in other activities, and expected date of graduation.

For fall and spring semesters, the maximum number of hours in which a student may enroll is 19, and 16 hours is the maximum credit load for those on probation. Permission of the student's academic advisor is required for all registration in more than 19 hours, or 16 hours for those on probation. Undergraduate students may register for a total of 20 credits during the summer sessions: 10 during First Summer and 10 during Second Summer. Credits taken in Minimester A and Minimester B are counted in First Summer. Credits taken in Minimester C and Minimester D are counted in Second Summer. Credits taken in the Regular Summer session are divided equally between First Summer and Second Summer. Enrollment in additional credit hours must be approved by the student's academic advisor.

Students are not permitted to enroll in courses with overlapping class times.

## Full-Time Enrollment

In fall and spring semesters, enrollment in 12 or more credit hours is considered full time, and combined enrollment in 12 or more hours in summer terms is considered full time for the summer. Enrollment in fewer than 12 credit hours is part time.

## Advanced Placement and Credit by Examination

In addition to earning credit by the usual method involving classroom attendance, a student may receive credit toward his/her degree by completing a course successfully by examination only. Freshmen interested in exempting some elementary courses in this manner should participate in the College Board Advanced Placement or International Baccalaureate program and have the results of these tests sent to Clemson.

Certain departments will also grant credit for successful completion of College-Level Examination Program (CLEP) subject examinations, which are administered by the College Board.

Enrolled students may earn credit by means of a special examination without the necessity of class attendance subject to the following requirements:

1. The applicant must present evidence that he/she has received training or taken work which is approximately equivalent to that given in the course at Clemson for which an examination is requested.
2. The applicant must not have previously failed or audited the course at Clemson.
3. The applicant must apply in writing for the examination; the request must be approved by the instructor, chair of the department in which the course is taught, and the Enrolled Student Services Office. Application forms are available in the Enrolled Student Services Office, 104 Sikes Hall.

Credit (CR) will be awarded for acceptable work in lieu of letter grades in recognition of college-level achievement as determined by College Board Advanced Placement Examination, International Baccalaureate Program, College-Level Examination Program subject examination, institutional special examinations, and similar instruments.

## Transfer Credit

Coursework completed with a grade of C or better by currently enrolled Clemson students at other regionally accredited institutions, including correspondence courses, telecourses, online courses, and exempted courses, will be evaluated for transfer in terms of equivalent courses included in the Clemson curriculum of the student's choice. This does not guarantee that all courses taken at other institutions will be accepted for transfer. The acceptability of each course or exemption will be based on an evaluation by the Office of Admissions. Students should obtain approval from the academic advisor for a course prior to enrolling in the course. By obtaining advance approval, the student is assured of receiving proper credit at Clemson upon satisfactory completion of the course. Information and forms relative to this approval may be obtained in the Enrolled Student Services Office, 104 Sikes Hall. Coursework earned at different institutions will not be joined to equate with one Clemson course. No course taken at a nonbaccalaureate-degree granting institution may be used as an equivalent or substitute for any 3000- or 4000-level Clemson course. Relative to academic eligibility, graduation, and transcripts, only grades earned at Clemson are used in computing the student's grade-point average. Grades earned in qualifying (i.e., non-

remedial) transfer courses will be used in calculating the student's grade-point average for South Carolina LIFE Scholarship awards. Non-remedial college classes completed while in high school are also included in this calculation.

Learning experiences including, but not limited to, military service schools, non-collegiate sponsored instruction, work-related experiences, etc., will not be evaluated for transfer; however, enrolled students may request credit by examination for any non-transferable learning experience. For additional information, see *Advanced Placement and Credit by Examination* above.

## Learning Experiences

All "for credit" learning experiences conducted with organizations other than accredited higher education institutions must be regularly supervised by appropriate members of the Clemson University faculty or staff. The student must be enrolled at the time the credit is generated, and the level of credit (grade) is the responsibility of the faculty member(s) in the discipline from which the grade originates.

## External Education Experiences

In all "for credit" external educational programs that Clemson University may have with professional, vocational, technical, clinical, and foreign study, the agreements are to be agreed to through signature of the provost and the president. In such cases, learning experiences for which credit is awarded must be under the ultimate control and supervision of Clemson University.

## GRADING SYSTEM

The grading system is as follows:

*A–Excellent* indicates work of a very high character, the highest grade given.

*B–Good* indicates work that is definitely above average, though not of the highest quality.

*C–Fair* indicates work of average or medium character.

*D–Pass* indicates work below average and unsatisfactory, the lowest passing grade.

*F–Failed* indicates that the student knows so little of the subject that it must be repeated in order that credit can be received.

*I–Incomplete* indicates that a relatively small part of the semester's work remains undone. Grade *I* is not given a student who made a grade *F* on his/her daily work. The incomplete grade is calculated as an *F* in the student's grade-point average until the work is made up and a final grade is assigned. Students are allowed thirty days after the beginning of the next scheduled session, excluding summers and regardless of the student's enrollment status, to remove the incomplete grade. Normally, only one extension for each *I* may be granted, and this under unusual circumstances. The extension must be submitted by the instructor of the course and will indicate the time limit. (Students under this policy are prohibited from removing the *I* by repeating the course.) A letter grade of *I* converts to *F* unless the incomplete is removed within the time specified.

*W-Withdrawn* indicates that the student withdrew from the course or was withdrawn by the instructor after the first two weeks of classwork and prior to the last five weeks of classes, not including the examination period. Proportionate time periods apply during summer and other shortened sessions. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of midnight on the last day to drop without a *W* grade. Withdrawal can negatively impact financial aid eligibility if a student does not complete a sufficient number of hours. Details are available at [www.clemson.edu/finaid](http://www.clemson.edu/finaid).

### Grade-Point Average

In calculating a student's grade-point average, the total number of grade points accumulated by the student is divided by the total number of credit hours attempted at Clemson during the semester, session, or other period for which the grade-point average is calculated. For each credit hour, the student receives grade points as follows: A-4, B-3, C-2, D-1. No grade points are assigned for grades *F*, *I*, *P*, *NP* or *W*.

### Pass/No Pass Option

Only courses to be used as electives may be taken optionally as Pass/No Pass. If a degree program includes elective credit(s), a student may apply up to 12 elective credits earned using the Pass/No Pass option. If a degree program does not include elective credits, a student may take courses using the Pass/No Pass option but the credits will not apply to the degree.

Registration in Pass/No Pass courses will be handled in the same manner as letter-graded courses. Departmental approval must be obtained for the Pass/No Pass option via approval form and returned to the Registration Services Office in E206 Martin Hall by the last day to register or add a class, as stipulated in the Academic Calendar.

Instructors will submit letter grades to the Registration Services Office. These grades will be converted as follows: A, B, C to *P* (Pass); D, F to *NP* (No Pass). Only *P* (minimum letter grade of C) or *NP* will be shown on a student's permanent record and will not affect the grade-point average.

If a student changes to a major that requires a previously passed course and this course has been taken Pass/No Pass, he/she may request either to take the course on a letter grade basis, that the *P* be changed to a *C*, or that another course be substituted.

### Dropping Classwork

A subject dropped after the first two weeks of classwork and prior to the last five weeks during the fall and spring semesters is recorded as *W-Withdrawn*. Proportionate time periods apply during summer sessions and other shortened sessions.

### Mid-Term Evaluation

Once, near mid-term, but no later than ten days before the last day students can drop courses without receiving final grades, instructors of every undergraduate course shall make available for each student (a) that student's numerical course grade or (b) that student's letter ranking to date in that course (*A-F* or *P/ NP*). More frequent feedback is strongly encouraged.

Both student and instructor are to recognize that this feedback reflects the student's performance up to that point in time, and as such, that student's final course grade may change based upon subsequent coursework performance(s).

The policy includes all undergraduate courses and applies to all terms, including summer sessions.

### Final Examinations

The standing of a student in his/her work at the end of a semester is based upon daily class work, tests or other work, and final examinations. Faculty members may excuse from final examinations all students having the grade of *A* on the coursework prior to the final examination. For all other students, examinations are required in all subjects at the end of each semester, except in courses in which final examinations are not deemed necessary as approved by the department faculty.

Final examinations must be given or due on the dates and at the times designated in the final examination schedule, except in laboratory and one-credit-hour courses for which the final exam will be given at the last class meeting.

All courses (including online courses) that specify a standard day of the week and standard meeting time are assigned a final exam date and time during exam week. All courses in regular terms that do not specify a standard day of the week and standard meeting time are not assigned a final exam date and time, and the final exam must be given during examination week at a date and time determined by the instructor. This date and time must be stipulated in the syllabus.

### Grade Reports

Students may access their end-of-term grades online. Final grade reports are mailed to undergraduate students on academic probation and to other students upon request. Request forms are available in the Registration Services Office in E206 Martin Hall.

### Academic Eligibility Policy

All students are expected to study and perform to the best of their abilities. The academic eligibility standards listed below represent minimum levels to remain enrolled at the University. A student who fails to meet these standards is not making satisfactory academic progress and should seek additional assistance from an academic advisor, the Academic Recovery Program, or other appropriate University resources.

### Academic Eligibility Definitions

The following terms identify levels of academic difficulty pertinent to a student's academic eligibility.

**Academic Alert:** A student who earns a semester grade-point average below 1.5, regardless of cumulative grade-point average, is placed on academic alert. No notation concerning academic alert will appear on the student's permanent record.

**Academic Probation:** A student who fails to maintain a cumulative grade-point average of 2.0 or higher is placed on academic probation. No notation concerning probation will appear on the student's permanent record. A student on academic probation may enroll in a maximum of 16 credit hours, unless

permission for a higher course load is granted by the academic advisor. Students on academic probation are expected to participate in the Academic Recovery Program.

**Academic Suspension:** A suspended student is ineligible to enroll in classes for the fall or spring semester immediately following the suspension notification. Suspension is for one semester only, and the student is eligible to reenroll the following semester.

**Academic Dismissal:** A student who enrolls after a suspension is subject to dismissal at the end of the next semester in which he/she does not meet the academic eligibility criteria listed below. The period of dismissal is for one calendar year and readmission is by appeal only. A dismissed student who is readmitted and again fails to meet academic eligibility standards will be permanently dismissed. Permanent dismissal may not be appealed, and a student permanently dismissed may not apply for Academic Renewal.

A student on academic probation for two consecutively enrolled semesters is evaluated to determine academic eligibility. Eligibility for continued enrollment is evaluated at the end of each semester unless otherwise indicated in this policy. Students with only one complete semester will not be evaluated.

The evaluation for academic eligibility is separate from the evaluation for satisfactory academic progress required for Student Financial Aid. Further information on satisfactory academic progress for financial aid purposes is available in the Financial Information section of this catalog and at [www.clemson.edu/finaid](http://www.clemson.edu/finaid).

### Academic Eligibility Standards

A student on academic probation (cumulative grade-point average below 2.0) will remain academically eligible if one of the following conditions is met.

1. The student passes at least 12 credit hours and earns a 2.4 or higher semester grade-point average. Duplicate credits do not count as credits passed unless otherwise required to meet an alternative departmental standard.
2. The student achieves the Minimum Cumulative Grade-Point Average (MCGPA) listed below.

Total Attempted Hours*	MCGPA
16-29	1.75
30-59	1.85
60-89	1.95
90+	2.00

\*Total Attempted Hours includes all credit hours attempted at Clemson, plus any advanced standing received from transfer credits and credits based on approved examination programs. Only grade points earned at Clemson are used to calculate the MCGPA.

3. The student achieves a cumulative grade-point average of 2.0 or higher.

### Academic Eligibility Evaluation

Academic eligibility criteria are different for students who have completed fewer than three semesters, students who have completed at least three semesters, students who have been suspended, and students returning on appeal, as described below. Conditions of academic eligibility standards are described in the previous section.

1. A student who has completed fewer than three fall and spring semesters will be evaluated at the end of his/her first spring semester, unless he/she entered the university that semester. If the student has two consecutive semesters on academic probation, he/she is eligible to enroll in the subsequent summer and fall semester, but must meet academic eligibility standards at the end of fall semester to avoid suspension for the following spring semester. This term of suspension is not appealable.

2. After a student has completed three regular (fall and spring) semesters, he/she will be evaluated at the end of each fall and spring semester. If the student has two consecutive semesters on academic probation and fails to meet academic eligibility standards, he/she will be suspended for the next regular (fall or spring) semester. A student subject to suspension at the end of spring semester may enroll in summer school and will avoid suspension if he/she meets academic eligibility standards.

3. A student enrolled after being suspended is evaluated at the end of each fall and spring semester until a cumulative grade-point average of 2.0 or higher is achieved. A previously suspended student on academic probation who fails to meet academic eligibility standards will be dismissed at the end of the following fall or spring term for one calendar year and permitted to enroll only as a result of a successful appeal.

4. A student permitted to reenroll due to a successful appeal of suspension or dismissal is evaluated at the end of each fall and spring semester until a cumulative grade-point average of 2.0 or higher is achieved. A student who fails to meet academic eligibility standards will be suspended or dismissed, according to his/her academic situation.

### Appealing Suspension or Dismissal

In the event a student subject to suspension or dismissal is unable to achieve one of the above outcomes as a result of extenuating circumstances, the student may file a written appeal with the Appeals Committee on Academic Eligibility. If this appeal is denied, the student may file subsequent appeals for readmission after any subsequent semester.

The Appeals Committee on Academic Eligibility meets approximately one week after final examinations in May and August. The committee meets in early January to read the appeals of students wishing to enroll for the spring semester. Students should contact the Office of Undergraduate Studies for further information on the appeals process. Appeals will be granted only in the most exceptional cases and may require the student to adhere to additional criteria in order to remain enrolled at the University.

### Grade Protests

A student wishing to protest a final course grade must first try to resolve any disagreement with the instructor. If unable to reach a resolution, the student may follow the procedures listed under *Academic Grievance Policy*. Grievances must be filed within 30 calendar days (exclusive of summer vacation) of the date of the last exam for the term involved.

### Repeating Courses Passed

A student may repeat a course passed with a grade lower than B. Repeating a course graded D or C does not erase the original D or C grade. If a student elects to apply Academic Forgiveness to a course graded D, the Academic Forgiveness Policy below will apply. Otherwise, both grades appear on the record and are computed in the cumulative grade-point average. A course graded C cannot be forgiven. Credit for the same course will be counted only once toward the number of hours required for graduation. For academic eligibility purposes, duplicate credits do not count as credits passed. For financial aid purposes, duplicate credits do not count as credits completed for satisfactory progress. If a student repeats a course passed with grade of B or better, the credits and grade points earned in the repeat attempt will be removed from the cumulative summary.

### Repeating Courses Failed

A student who has failed a course cannot receive credit for that course until it has been satisfactorily repeated hour for hour in a class; except that in the case of co-related laboratory work, the number of hours to be taken shall be determined by the instructor.

Where separate grades for class and laboratory work are given, that part of the subject shall be repeated in which the failure occurs. Successfully repeating a course previously graded F does not erase the original F grade from the student's record. If a student elects to apply Academic Forgiveness to a failed course, the Academic Forgiveness Policy below will apply. Otherwise, both grades appear on the record and are computed in the cumulative grade-point average.

### Academic Forgiveness Policy

The Academic Forgiveness Policy (AFP) allows a student enrolled beginning Fall 2013 or after to eliminate from the GPA calculation up to three courses in which a D or F was earned. Students enrolled prior to Fall 2013 who were under the former Academic Redemption Policy will be allowed academic forgiveness on a modified scale. Detailed information is available at [www.registrar.clemson.edu](http://www.registrar.clemson.edu).

The following conditions apply:

Courses taken prior to fall semester 2003 may not be considered for academic forgiveness.

While D or F grades in required courses may be eliminated before the course is repeated, any course used to meet a graduation requirement must be repeated satisfactorily at Clemson University. Both grades will remain on the transcript, degree progress report, and other official documents. For financial aid purposes, courses repeated under this policy resulting in duplicate credit do not count for satisfactory academic progress.

The AFP shall apply only to courses taken at Clemson University. Course substitutions are not permitted. Students may not invoke the AFP after they have graduated. After graduation, students may repeat coursework, but both grades will be calculated in the grade-point average.

The AFP may not be applied to a course taken on a Pass/No Pass basis or to any course in which the student was previously found in violation of the academic integrity policy.

Further information on specific questions related to the use of Academic Forgiveness can be found at <http://www.registrar.clemson.edu/html/acadForgiveness.htm>.

## CLASSWORK

### Academic Advising

Each student is assigned an academic advisor in his/her major area. It is the responsibility of the student to consult with his/her advisor during registration. The advisor will assist the student in scheduling courses so as to fulfill the requirements of the degree program; nevertheless, it is the responsibility of the student to fulfill the relevant requirements of the degree. For more information, visit <http://www.clemson.edu/academics/advising/>.

### Course Prerequisites

Prerequisites for each course are enumerated in the *Courses of Instruction* section of this catalog. In addition to these requirements, colleges and departments may also establish other standards as conditions for enrollment. It is the student's responsibility to refer to individual college and curricular information for specific standards.

### Course Substitutions

A student may request substitution of a course, whether Clemson credits or transfer credits, for a curriculum requirement in the major, the minor, or General Education. Course substitutions will be applied toward degree requirements only after approval by all the appropriate academic signatories. Students should initiate the request with their assigned academic advisor using the Form to Request Substitution for an Academic Requirement, available on the Registrar's Web site, [www.registrar.clemson.edu](http://www.registrar.clemson.edu).

All requests for course/requirement substitutions must be submitted and approved as early as possible and prior to the start of the student's final semester at Clemson University (i.e., the graduation semester). It is the student's responsibility to ensure that the necessary forms have been processed and signed. Failure to follow these guidelines may result in the student's graduation being delayed to at least the following semester.

### Attendance Policy

The academic resources of Clemson University are provided for the intellectual growth and development of students. Class attendance is critical to the educational process; therefore, students should attend scheduled courses regularly if they are to attain their academic goals.

In the event of an emergency, the student should make direct contact with the course instructor, preferably before a class or an exam takes place. Students should speak with their course instructors regarding any scheduled absence as soon as possible and develop a plan for any make-up work. It is the student's responsibility to secure documentation of emergencies, if required. A student with an excessive number of absences may be withdrawn at the discretion of the course instructor.

Course instructors must implement fair grading procedures and provide an opportunity to make up missed assignments and examinations that does

not unfairly penalize the student when an excused absence is accepted. Such make-up work shall be at the same level of difficulty with the missed assignment or examination. Course instructors shall hold all students with excused absences to the same standard for making up missed assignments or examinations. While course instructors should seek to make reasonable accommodation for a student involved in University-sponsored activities, students should understand that not every course can accommodate absences and that absences do not lessen the need to meet all course objectives.

Absence from class is detrimental to the learning process, so course instructors may use reasonable academic penalties which reflect the importance of work missed because of unexcused absences. Course instructors who penalize students for unexcused absences must specify attendance requirements as related to grading in the course syllabus and must keep accurate attendance records. Course instructors are obligated to honor exceptions to the university attendance policy for students covered by the Americans with Disabilities Act, as verified through paperwork issued by Student Disability Services.

### Enrollment

Only students who are officially registered and have paid appropriate fees may attend classes. Students have the responsibility to insure that drop/add transactions are completed in a timely manner. Registered students who cease attending class will be assigned a failing grade.

All students are required to attend the first scheduled day of classes and labs. Students who cannot attend the first class are responsible for contacting the instructor to indicate their intent to remain in that class. If a student does not attend the first class meeting or contact the course instructor by the second meeting or the last day to add, whichever comes first, the course instructor has the option of dropping that student from the roll. Students must not assume that course instructors are obligated to drop them if they fail to attend the first few days of class.

### Anticipated Absences

Students should use the Notification of Absence module in Blackboard, or other reasonable means, to notify the course instructor of a future absence from class. This communication is only for information and does not verify the student's reason for absence or impact the course instructor's evaluation of the student's academic work. The student must make personal contact with the course instructor as soon as possible.

If a student realizes in the first two weeks of classes that an anticipated number of absences will exceed the number of excused absences permitted in the course, the student should discuss the situation with the course instructor, the student's adviser, and/or the academic Associate Dean in the college in which the student is enrolled. A suitable resolution should be reached before the end of the second week of the semester.

Students are encouraged to inform course instructors of known conflicts as soon as possible, but no later than one week before the date of any assignment or exam.

### Unanticipated Absences

Students should use the Notification of Absence module in Blackboard to notify the course instructor. This communication is only for information and does not verify the student's reason for absence or impact the course instructor's evaluation of the student's academic work. If the student is unable to contact course instructors, the student (or representative) should contact the Office of the Dean of Students, who will notify the course instructors of the circumstances, providing a liaison in cases limited by medical confidentiality. A student may be excused from attending class in cases of emergency or other compelling reasons deemed appropriate by the course instructor. Excuses for emergency absences must be reported to the course instructor as soon as possible (for example, through e-mail), but not more than one week after the return to class. In certain cases, the Dean of Undergraduate Studies (or designee) may provide a letter verifying the student's absence as excused. Course instructors are expected to excuse absences for reasons including:

1. A medical complication (pregnancy/childbirth-related, physical injury, illness, etc.) too severe or contagious for the student to attend class, when certified by an attending physician. Physicians and staff at Redfern Health Center do not provide written excuses; however, students should retain paperwork of medical visits affirming date and time. Whenever possible, students should visit Redfern as outpatients without missing class. An absence for a non-acute medical service does not constitute an excused absence. Course instructors may, at their discretion, require documentation of medical absences.

2. Death, serious illness, or emergency in a student's immediate family (course instructors may require documentation).

3. Participation in authorized University-sponsored activities, not to include practice for the activities. Course instructors may require documentation from the course instructors or staff advisor of the sponsored University group.

4. Religious observances and practices which prevent the student from being present during a class period (advanced consultation/approval by the instructor is necessary).

5. Participation in court-imposed legal proceedings (e.g., jury duty or subpoena).

6. Required participation in military obligations as certified by the student's commanding officer.

In the event of a regional or national emergency (e.g., pandemic, hurricane, etc.), students missing classes may not be charged with unexcused absences if the nature and extent of the emergency is defined and disseminated by the Provost (or designee).

### Appeals

Any student who feels that a grade has been affected by a legitimate absence that an instructor did not excuse may appeal the grade through the Academic Grievance process. Students may appeal, in writing, a course instructor's decision not to excuse an absence to the academic Associate Dean of the academic unit offering the course. Before taking action, the Associate Dean should request that the course instructor explain his or her denial in writing.

### Dead Days

During the last two class days of the fall and spring semesters, commonly referred to as *Dead Days*, all regularly scheduled classes are conducted; however, course testing on these days is limited to scheduled laboratory and one-semester-hour course final exams and make-up tests. Dead Days are observed during fall and spring semesters only. Dead Days do not apply to courses numbered 6000 or above.

### Auditing Policies

Qualified students may audit courses upon written approval of the instructor. Auditors are under no obligation of regular attendance, preparation, recitation, or examination and receive no credit. Participation in classroom discussion and laboratory exercises by auditors is at the discretion of the instructor. A student who has previously audited a course is ineligible for credit by examination.

Undergraduate and graduate students enrolled in 12 or more hours may audit courses at no additional charge. Others interested in auditing should verify their eligibility through the Registrar's Office.

### Combined Bachelor's/Master's Plan

Students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. To be eligible, the student must have completed the bachelor's curriculum through the junior year (minimum 90 credits) and have a minimum overall grade-point average of 3.4. A maximum of 12 credit hours of graduate courses in the master's program may be applied to the bachelor's program. As determined by the participating bachelor's program, graduate courses may be applied to the bachelor's degree as electives or technical requirements or by substitution of 7000- or 8000-level courses for required undergraduate courses. Under no circumstances can 6000-level counterparts of 4000-level courses required for the bachelor's degree be counted toward master's requirements. Combined bachelor's/master's plan students are not eligible for graduate appointments for financial aid until their bachelor's degrees have been awarded.

### Procedure for Students

Since neither all undergraduate nor graduate programs participate in this academic option, seniors should consult both their academic advisor and the graduate program coordinator of the master's program they wish to pursue. Students must officially request participation in the combined bachelor's/master's program by completion of Form GS6BS/MS, "Request for Combined Bachelor's/Master's Education Plan," available online at [www.grad.clemson.edu/forms/GeneralForms.php](http://www.grad.clemson.edu/forms/GeneralForms.php). Endorsements by the program coordinator or department chair of both programs are required.

### Procedure for Departments

Departments and graduate programs desiring to participate in the combined bachelor's/master's program should submit a written notification to the dean of the Graduate School identifying the date on which they intend to make this option available to their students.

## Senior Enrollment in Graduate Courses

Clemson University seniors meeting the accepted academic standard for graduate work (3.0 cumulative grade-point average) are eligible to request enrollment in graduate level courses. Enrollment of seniors in any graduate course is subject to approval by the department offering the course and the Graduate School. The total course workload for the semester must not exceed 18 hours, and the cumulative graduate credits earned by seniors shall not exceed 12 semester hours. The credits and quality points associated with senior enrollment in graduate courses will be part of the undergraduate record. Graduate courses that are not satisfying undergraduate requirements cannot be used to meet enrollment requirements for financial aid.

### Seniors with a 3.4 or Higher GPA

Seniors with 3.4 or higher grade-point averages are eligible for participation in the combined bachelor's/master's plan (see "Combined Bachelor's/Master's Plan").

### Seniors with a 3.0 or Higher GPA

Seniors with 3.0 or higher grade-point averages are eligible to request enrollment in graduate level courses to meet requirements for the bachelor's degree; however, courses used for this purpose cannot be counted later towards an advanced degree. Alternatively, these students may also take courses in excess of the requirements for their undergraduate degrees and may request that these courses be included as a part of their graduate program if they are subsequently admitted to the Graduate School. Courses cannot be taken at the 6000 level if their 4000-level counterparts are required for the undergraduate degree in the same academic major as the proposed graduate degree.

### Procedure for Students

Prior to registration, the Graduate School will approve and register the student in the graduate level courses requested on the GS6 or GS6 BS/MS. Senior enrollment forms, GS6, Request for Senior Enrollment, and GS6BS/MS, are available at [www.grad.clemson.edu/forms/GeneralForms.php](http://www.grad.clemson.edu/forms/GeneralForms.php).

## GRADUATION REQUIREMENTS

A candidate for an undergraduate degree is a student who has submitted a completed diploma application by the deadline prescribed in the University calendar for a particular graduation date. Candidates who do not apply by the deadline will be subject to a late fee.

Only candidates who have completed all graduation requirements are permitted to participate in the graduation ceremony.

### Residence Requirement

To qualify for an undergraduate degree, a student must complete through instruction from Clemson a minimum of 37 of the last 43 credits presented for the degree. A waiver may be obtained for approved study abroad experiences through the Undergraduate Studies Office, E-103 Martin Hall. (To qualify for the five-year professional undergraduate degree in Landscape Architecture, a student must complete through instruction from Clemson, a minimum of 42 of the last 48 credits presented for the degree.)

## Make-up of Incompletes Received in Last Semester

A candidate for a degree who receives one or more grades of *I* in the semester immediately prior to graduation shall have an opportunity to remove the unsatisfactory grades provided the final grades are received in the Registration Services Office, E-206 Martin Hall, by the time grades for candidates for graduation are due. A student who qualifies for graduation under this regulation will be awarded his/her degree on the regular date for the award of degrees.

### Special Requirements

A cumulative grade-point average of 2.0 is required for graduation. Candidates for graduation must be officially accepted in the major in which they are applying for a degree no later than the date applications for diplomas are due.

Bachelor of Arts degree programs require completion of a minor and four semesters (through 2020) of a modern foreign language.

### Awarding of Degrees Posthumously

An undergraduate student may be awarded a degree posthumously on the recommendation of the faculty of the college concerned, subject to the following conditions:

1. The student had at least a 2.0 grade-point average at the date of last enrollment;
2. Including credits scheduled in the term of last enrollment, the student (a) had satisfied 75% of the degree requirements and (b) met the residence requirement for a degree, which requires that 37 of the last 43 credits presented for a degree be earned at Clemson University; and
3. The student's death occurred within two years of the end of the term of last enrollment at Clemson University.

### Credit Limitation

If all work toward a degree is not completed within six years after entrance, the student may be required to take additional courses.

### Academic Honors

#### Honor Graduates

To be graduated with honors, a student must have a minimum cumulative grade-point average as follows: Cum Laude—3.70, Magna Cum Laude—3.85, Summa Cum Laude—3.95.

#### Honor Lists

At the end of the fall and spring semesters, the following lists shall be compiled of undergraduate students who have achieved grade-point averages of 3.50–4.00 on a minimum of 12 semester hours, exclusive of Pass/No Pass coursework.

- Dean's List—3.50 to 3.99 grade-point average
- President's List—4.00 grade-point average

#### Honors and Awards

The University offers a number of awards for outstanding achievement in specific fields and endeavors. Recipients are chosen by selection committees and are announced at the annual Honors and Awards Day program or other appropriate ceremonies. Detailed information relating to such awards is available in the offices of the academic deans and department chairs.

## Preprofessional Studies

Clemson University will award the degree of Bachelor of Arts or Bachelor of Science in Preprofessional Studies to a student who is pursuing a degree in a professional school. The student must have also satisfactorily completed three years of undergraduate work in an appropriate curriculum and the first year of work in an accredited medical, dental, veterinary, or other accredited professional school, provided the student fulfills the requirements for the three-year program as follows and the other specified conditions are met.

1. At least two of the three years of preprofessional work, including the third year, must be taken in residence at this University.

2. A minimum of three years of undergraduate work (i.e., preprofessional school credit) must be presented.

3. Normal progress must have been made toward fulfilling the degree requirement of the curriculum in which the student is enrolled at Clemson.

4. The student applying for the Bachelor of Arts or Bachelor of Science in Preprofessional Studies must be recommended by the college at Clemson in which the curriculum that he/she is majoring as a Clemson student is located or by the college in which three years of normal progress toward a degree can be identified.

5. If the combination of preprofessional work taken and the work in the first year of professional school is equivalent to that which is required in some other bachelor's degree program at Clemson, the college concerned may recommend the other bachelor's degree.

The above requirements and conditions became effective July 1, 1974, and will apply to all students who satisfy these requirements and conditions after that date.

A Clemson student having left the University before receiving the bachelor's degree (prior to July 1, 1974) and having enrolled immediately in an accredited professional postgraduate school may apply for a bachelor's degree from Clemson and have his/her application considered on an individual basis. The college(s) at Clemson considering the application is authorized to examine the student's entire record in both preprofessional and professional studies and exercise its own judgment concerning the three-year requirement for Preprofessional Studies.

## Second Baccalaureate Degree

To complete a second baccalaureate degree, a student must complete a minimum of 30 semester hours at Clemson in addition to the greater number of hours required for either degree and satisfy all course and grade requirements for the second degree.

## Double Major

A student in a Bachelor of Arts degree program may be awarded a single baccalaureate degree with a double major. The two majors may be within a single college or may involve two colleges but are limited to Bachelor of Arts degree programs. All major requirements for both programs must be satisfied.

## Graduate Degrees

Graduate degrees are available from all five colleges in addition to several interdisciplinary programs. Clemson University offers more than 100 graduate degree programs. The degrees of Doctor of Philosophy, Education Specialist, Master of Arts, Master of Science, Master of Agricultural Education, Master of Architecture, Master of Arts in Teaching, Master of Business Administration, Master of City and Regional Planning, Master of Construction Science and Management, Master of Education, Master of Engineering, Master of Fine Arts, Master of Forest Resources, Master of Human Resource Development, Master of Landscape Architecture, Master of Parks, Recreation and Tourism Management, Master of Professional Accountancy, Master of Public Administration, and Master of Real Estate Development are awarded to students who complete prescribed graduate programs.

Additional information is available from the Graduate School.

## ACADEMIC RECORDS

The student's permanent academic record is maintained in the Registrar's Office and contains personal identifying information, grades, and credits. Where appropriate, statements of a corrective nature, withdrawals, suspension for failure to meet academic standards, suspension for disciplinary reasons, and graduation data are added. The academic record is a historical record of the student's academic progress.

## Classification

All new students are classified as freshmen unless they have attended another college prior to entrance. Students who have completed college work elsewhere will be classified on the basis of semester hours accepted at Clemson rather than the amount of work presented. To be classified as a member of any class other than freshman, students must meet the credit-hour requirements below:

- Sophomore—minimum 30 credit hours
- Junior—minimum 60 credit hours
- Senior—minimum 90 credit hours

## Change of Major

Any undergraduate student who meets the Academic Eligibility Policy after attempting 12 credit hours at Clemson University (or who is allowed to continue by virtue of a semester 2.4 grade-point average on 12 earned credits or who is allowed to continue through appeal to the Appeals Committee on Academic Eligibility or by other authorization of this committee) may transfer from one major to another. Any college or department that seeks an exception to this policy must have the approval of the collegiate dean and the provost.

## Withdrawal from the University

A student may withdraw from the University subject to the restrictions in the section on *W-Withdrew*. All University withdrawals (including withdrawing from the only course in which a student is enrolled) must be processed by the Associate Dean of Undergraduate Studies. Students should report to E-103 Martin Hall. Students receiving financial aid who withdraw from the University may have to repay significant portions

of their financial aid. Students should report to G-01 Sikes Hall to determine the amount. For financial aid purposes, enrollment is defined and satisfactory academic progress levels are established as of midnight on the last day to drop without a *W* grade. Withdrawing from the University can negatively impact financial aid eligibility if a student has not completed a sufficient number of hours. Details are available at [www.clemson.edu/finaid](http://www.clemson.edu/finaid).

## Academic Renewal

The student who has not enrolled at Clemson for a period of two or more academic years may apply to the Appeals Committee on Academic Eligibility for readmission under special conditions known as academic renewal, unless the student has been permanently dismissed. Under the academic renewal conditions, the previous credits attempted and grade-point deficit will not constitute a liability in a new grade-point computation; however, no credits passed or their attending grade points will be available to the student for a degree at Clemson, and any courses previously passed may not be validated by special examination. The previous record will appear on the permanent record as well as the notation of readmission under the policy of academic renewal. Students returning under the academic renewal policy who apply for financial aid should submit written notification of their status to the Office of Student Financial Aid in order to update their academic progress record. For financial aid purposes, terms enrolled in prior to academic renewal are still counted when evaluating satisfactory academic progress.

## Transcripts

Official transcripts are issued only at the authorized, written request of the student. Requests should be directed to Transcripts, 104 Sikes Hall, Box 345125, Clemson, SC 29634-5125. Transcript Request forms may be downloaded at <http://www.registrar.clemson.edu/html/transcript.htm>. Payment in advance is required and may be made by Discover, MasterCard, American Express, VISA and TigerStripe. The following must be included with the transcript request: full name (including any names used while at Clemson), social security number, current address, date of birth, date the student last attended Clemson, where the transcript is to be sent, student signature, and payment of \$12 per transcript. Telephone requests will not be honored. Transcript requests are normally processed within 48 hours, but additional processing time may be required at the end of a semester. Information is available from the Enrolled Student Services Office at the address above or by telephone at (864) 656-2173. Official transcripts are not issued for those who are indebted to the University.

## UNDERGRADUATE ACADEMIC INTEGRITY

As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a "high seminary of learning." Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form.

## I. Academic Integrity Policy

A. Any breach of the principles outlined in the Academic Integrity Statement is considered an act of academic dishonesty.

B. Academic dishonesty is further defined as:

1. Giving, receiving, or using unauthorized aid, including the inappropriate use of electronic devices, on any work submitted to fulfill academic requirements. In examination situations, all electronic devices must be off and stowed unless otherwise authorized by the instructor;

2. Plagiarism, which includes the intentional or unintentional copying of language, structure, or ideas of another and attributing the work to one's own efforts;

3. Attempts to copy, edit, or delete computer files that belong to another person or use of computer accounts that belong to another person without the permission of the file owner or account owner;

C. All academic work submitted for grading or to fulfill academic requirements contains an implicit pledge and may contain, at the request of an instructor, an explicit pledge by the student that no unauthorized aid has been received.

D. It is the responsibility of every member of the Clemson University community to enforce the Academic Integrity Policy.

## II. Academic Integrity Committee

The power to hear cases of academic dishonesty is vested in an Academic Integrity Committee.

A. Structure—The Academic Integrity Committee is composed of twenty members as follows:

1. Ten tenured members of the faculty; two members from each college elected by their respective collegiate faculties. Faculty members will be elected on a staggered term basis, serving for a period of two years after initiation of staggered terms. Terms commence with fall semester late registration.

2. Ten members of the undergraduate student body; two from each college. Student members are nominated by the Student Body President, through an application and interview process in the spring semester, approved by the Student Senate, and appointed by the provost for terms of two years. Students must have a 3.0 grade-point average at the time of appointment and must have completed 30 hours by the end of the spring semester. Nominations will be made in the spring semester with terms of service commencing with fall semester late registration.

3. The committee is divided into four standing boards, hereafter referred to as hearing boards, which will hear the cases of academic dishonesty. Hearing boards convene on a weekly, rotational basis unless there are no cases to be heard. For summer sessions, the Associate Dean of Undergraduate Studies must maintain at least one hearing board to hear cases.

4. Hearing boards are composed of two faculty members, two students, and one chairperson. Quorum, for a hearing board, is one student, one faculty member, and a chairperson. Decisions by the hearing board will be by majority vote.

5. Chairpersons will be elected from within the Committee's membership. Two chairpersons are selected from the faculty membership and two from the student membership.

6. Before hearing any cases, a new member of the committee must undergo a training session(s) with the Associate Dean of Undergraduate Studies.

7. The Associate Dean of Undergraduate Studies is the administrative coordinator of the Academic Integrity Committee.

#### B. Procedures

1. When, in the opinion of a course instructor, there is evidence that a student has committed an act of academic dishonesty, that person must make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean of Undergraduate Studies. The reporting person may, at his/her discretion, inform each involved student privately of the nature of the alleged charge. In cases of plagiarism (I.B.2.) instructors may use, as an option, the Plagiarism Resolution Form available from the Office of Undergraduate Studies.

2. When, in the opinion of a student, there is evidence that another student has committed an act of academic dishonesty, he/she should contact the instructor for the course to discuss the incident. After being contacted, if, in the opinion of the instructor, there is evidence that a student has committed an act of academic dishonesty, the instructor must make a formal written charge of academic dishonesty, including a description of the misconduct, to the Associate Dean of Undergraduate Studies. The instructor may, at his/her discretion, inform each student involved privately of the nature of the alleged charge.

3. If, for any reason, the person who first discovered an integrity violation is not available to present a charge, the department chair (or designee) or college Associate Dean for the department in which the course is taught may submit the charge to the Associate Dean of Undergraduate Studies.

4. When the Associate Dean of Undergraduate Studies has received a formal charge of an alleged violation, he/she will contact the student involved privately to notify him/her of the charge and will provide the student with a copy of the charge and a copy of the procedures that the Academic Integrity Committee has adopted, pursuant to number 7 below. If a student is charged with academic dishonesty, he/she may not withdraw from the course unless he/she is exonerated of the charge. Students may not forgive a grade under the Academic Forgiveness Policy if that grade was the penalty for violation of the Academic Integrity Policy. If the student fails to respond to the Associate Dean's requests for a meeting within ten university working days, the student is considered to have waived his/her right to a hearing, thus admitting to being in violation of the Academic Integrity Policy.

5. After informing the student involved, the Associate Dean of Undergraduate Studies will convene one of the boards of the Academic Integrity Committee within 14 calendar days (exclusive of University holidays) from the date that the accused student provides a written rebuttal to the charge. The student will provide the rebuttal no later than five university working days following notification of the charge from Undergraduate Studies. (Students charged in the spring term, but not enrolled in summer sessions, may be given a continuance to the next fall term.) Should the University schedule be interrupted due to emergency circumstances, academic integrity cases will be resolved as soon as possible once classes resume. If the student fails to provide his/her rebuttal to the

Associate Dean within five university working days, the student is considered to have waived his/her right to a hearing, thus admitting to being in violation of the Academic Integrity Policy. All students will be presumed not in violation of a charge until found in violation by a hearing board. Each party is responsible for having present at the hearing all witnesses that he/she wishes to speak on his/her behalf. Witnesses must have first-hand knowledge of the events under discussion.

6. A charge of academic dishonesty in a course must be made within thirty days after the beginning of the next term, exclusive of summer vacation. For cases that are not resolved before course grades are due, instructors will assign a grade of *I* (Incomplete) as a placeholder for the grade. This *I* grade will be replaced with the course grade once the case is resolved.

7. The Academic Integrity Committee will adopt its procedures, to be followed by all hearing boards, prior to the first case heard by a hearing board. In addition to providing the student with a copy of the procedures, as stated in number 4 above, the Associate Dean of Undergraduate Studies will provide a copy of the procedures to the involved course instructor and also the hearing board members. The Associate Dean of Undergraduate Studies will also retain copies of these procedures. The procedures must afford both instructors and students the opportunity to present their cases and the opportunity for rebuttal.

8. In cases in which there is a finding of "in violation," the course instructor may consult with the Associate Dean of Undergraduate Studies to consider any past precedent established regarding academic penalties levied in similar cases. Instructors must inform the Associate Dean of Undergraduate Studies of the academic penalty for a student found "in violation" by a hearing board.

9. The Associate Dean of Undergraduate Studies is responsible for notifying the registrar and all other appropriate University personnel of the finding of "in violation" and the academic penalty. The Associate Dean of Undergraduate Studies retains all records of academic dishonesty cases and their findings in accordance with the University's Records Retention Policy.

#### C. Penalties

1. Upon a finding of "not in violation" by a hearing board, the student's record will not reflect the incident.

2. If a student is found to have violated the integrity policy in connection with a class assignment or requirement, the offense will be recorded and the Associate Dean of Undergraduate Studies will notify the student and course instructor of the decision immediately. If the offense is the first for the student, then the instructor has the ability to determine the academic penalty, which shall not exceed a grade of F for the course. If such first offense occurs in connection with other (non-course) University-affiliated activities such as but not limited to ePortfolios, essay competitions, or undergraduate conferences, the offense shall be recorded by the Associate Dean of Undergraduate Studies and penalized by requiring the student to enroll in and successfully complete a course or program on Academic Integrity, as determined by the Associate Dean.

3. If the finding of "in violation" is not the student's first offense, the student will receive a grade of F in the instance of coursework, and, in all cases, will

be suspended from the University for one or more semesters, and may be permanently dismissed from the University. The hearing board will determine the period for which the student will be suspended or, if applicable, permanently dismissed. If the accused student waives his/her right to a hearing and the incident is not a first offense, the student will receive a grade of F in the case of coursework and, in all cases, will be suspended from the University for one or more semesters or will be permanently dismissed, at the discretion of the Associate Dean of Undergraduate Studies.

4. An undergraduate student who has been suspended from the University for a violation of the Academic Integrity Policy becomes immediately ineligible for University merit or need-based scholarship or grant aid for the remainder of the student's undergraduate enrollment at Clemson. (See complete policy in Financial Aid section, p. 23.)

#### D. Appeals

1. Students do not have the option to appeal a decision rendered by the hearing board, whether it is the first, second, or any subsequent offense. Students do not have the option to appeal the penalty determined by the course instructor or the Associate Dean of Undergraduate Studies for first offenses or to appeal the grade of F for the course given for second or subsequent offenses.

2. For offenses resulting in suspension or permanent dismissal, students have the option to present written information to the Dean of Undergraduate Studies to appeal the length of the suspension or to appeal a decision of permanent dismissal. Students must present information in their defense, as allowed in this paragraph, to the Dean within five university working days after receipt of written notification of the suspension or dismissal. However, as stated in number 1 above, students cannot appeal a decision rendered by the hearing board.

## ACADEMIC GRIEVANCE POLICY

### I. Purpose

Clemson University is dedicated to the fair and impartial review of grievances by students against faculty and staff. The Academic Grievance Board is responsible for reviewing and adjudicating allegations by undergraduate students of unfairness or inequity in the assigning of final grades. Only grievances that contest a final grade are considered by the Academic Grievance Board.

### II. Structure

The Academic Grievance Board comprises three separate entities: a seven-person Academic Grievance Panel, a 25-person Academic Grievance Committee, and a three-person Academic Grievance Expedited Committee.

The Academic Grievance Panel is responsible for the initial review of grievances and for determining which grievances will go forward to the Academic Grievance Committee (see section IV.4 below). There are five faculty representatives to the Academic Grievance Panel, one from each of the five colleges. The faculty members of the Academic Grievance Panel are appointed by the Dean of Undergraduate Studies for three-year terms. In addition, there are two



undergraduate student representatives to the panel appointed for two-year terms. Undergraduate student representatives are selected on a rotating basis from each of the five colleges. The student representatives are appointed to the Academic Grievance Panel by the President of the Student Senate. The Academic Grievance Panel will elect a chair each year, chosen from among the faculty members on the Academic Grievance Panel.

The Academic Grievance Committee is responsible for hearing student grievances, proposing resolutions to grievances, and, in the case of appeals, forwarding recommendations to the Dean of Undergraduate Studies. Grievances are heard by three-person subcommittees, appointed by the Chair of the Academic Grievance Committee. The Academic Grievance Committee may hear a grievance only if a recommendation for a hearing is made by the Academic Grievance Panel. The Academic Grievance Committee consists of 15 faculty representatives, three from each college, and ten student representatives, two from each college. Faculty representatives are elected by their colleges and serve three-year terms. Student representatives are appointed by the President of the Student Senate and serve two-year terms. The Chair of the Academic Grievance Committee is appointed by the Dean of Undergraduate Studies.

Before hearing any cases, a new member of the Academic Grievance Board must undergo a training session(s) with the Associate Dean of Undergraduate Studies.

The Academic Grievance Expedited Committee is responsible for hearing certain grievances for students that are to be graduating in the same semester the contested grade is presented to the committee (see section V). The Academic Grievance Expedited Committee comprises the Dean of Undergraduate Studies, and two available members (one faculty, one student) of the Academic Grievance Committee. The Academic Grievance Expedited Committee will only follow the procedure established under "Supplementary Procedure for Graduating Seniors" (see section V below).

### III. Grounds for Academic Grievances

The Academic Grievance Board provides for hearings on academic grievances that are based on either or both of the following claims:

A. The method used for arriving at a student's final grade was in clear violation of the method described in the instructor's course syllabus.

B. The method used for arriving at a student's final grade was in clear violation of departmental, college or university policy.

The Academic Grievance Board will not attempt to substitute its judgment for an instructor's on such matters as a) quality of the instructor's teaching, b) quality of the student's work, or c) quality of course content.

The Academic Grievance Committee shall not hear any grievances including allegations of discrimination based on age, color, disability, gender, national origin, race, religion, sexual orientation, or veteran's status even if the grievance falls within one of the categories noted above. All such discrimination complaints should be submitted to the Office of Access and Equity in 110 Holtzendorff, 656-3181. The Academic Grievance Committee shall refer any such discrimination complaints it receives to the Office of Access and Equity.

cess and Equity in 110 Holtzendorff, 656-3181. The Academic Grievance Committee shall refer any such discrimination complaints it receives to the Office of Access and Equity.

### IV. Rules and Procedures for Academic Grievances

1. Any student filing a grievance must first attempt to resolve it by consulting with the involved faculty member. In the event that the student and faculty member cannot arrive at a resolution, the student shall consult with the department chair of the faculty member and the Dean of the college of the faculty member. The department chair and Dean shall make every effort to help the student and the faculty member arrive at a resolution to the problem. Until a formal complaint is filed, the student may consult with the Undergraduate Student Ombudsman.

2. If the grievance remains unresolved, the student may bring the grievance before the Academic Grievance Board. The student must first meet with the Associate Dean in the Office of Undergraduate Studies. The Associate Dean will describe the grievance process to the student. If the student wishes to proceed with the grievance, the student will provide a written statement detailing the grievance to the Associate Dean. The written statement must specify the specific syllabus, departmental, college or university policy that the student alleges to have been violated. In addition, the student will secure, from the Office of Undergraduate Studies, a grievance checklist form. On this form, identified by complaint number, the student will document the following: (a) the dates of those consultations described in procedure IV.1 above, (b) the names of those persons consulted, and (c) the signature of the collegiate Dean attesting that no resolution could be reached. The completed checklist form will then be returned to the Associate Dean for signature. Both the written statement and the completed checklist form must be delivered to the Office of Undergraduate Studies within the first 30 calendar days (exclusive of summer vacation) of the term following that in which the student alleges to have been aggrieved. The failure of a student to file a grievance within the 30-day period will cause him/her to forfeit his/her right to file a grievance under this procedure.

3. When all procedures described in item IV.2 have been completed, the Office of Undergraduate Studies will forward a copy of the grievance to the chair of the Academic Grievance Panel. The chair of the Academic Grievance Panel shall, upon receipt of the grievance, convene the Academic Grievance Panel to review the grievance. The Office of Undergraduate Studies shall retain the original documents.

4. The Academic Grievance Panel will review the grievance and ascertain whether the complaint meets the criteria for "Grounds for Academic Grievances" (III above). The Academic Grievance Panel will handle each case in a confidential manner.

5. Following the complaint review, the Academic Grievance Panel, within 14 days of receiving the complaint, will (a) make a written recommendation to the Associate Dean to dismiss the grievance, with the grievance identified by complaint number, or (b) make a written recommendation to the Academic Grievance Committee to hear the grievance and arrive at a recommendation. In the case that the Academic Grievance Panel recommends that the

grievance be heard by the Academic Grievance Committee, a copy of the recommendation, identified by complaint number, will be forwarded to the Office of Undergraduate Studies.

6. If the Academic Grievance Panel recommends dismissal of the case, the Associate Dean will notify the student, the involved faculty member, the department chair of the involved faculty member, and the involved collegiate Dean.

7. If the Academic Grievance Panel recommends a hearing, the Chair of the Academic Grievance Committee shall, upon receipt of the recommendation from the Academic Grievance Panel and all relevant documents, appoint a three-person subcommittee to hold a hearing on the grievance. The subcommittee will be selected from among the members of the Academic Grievance Committee. The subcommittee will consist of a faculty member assigned to serve as the subcommittee chairperson, another faculty member, and a student representative to the subcommittee. The Chair of the Academic Grievance Committee may serve as one of the two faculty representatives to the subcommittee. If possible, the subcommittee shall include members who are not in the same college as the grievant or the faculty member against whom the grievance has been filed.

8. Prior to chairing a hearing (see item 9 below) the chairperson of the subcommittee will contact the student who has filed the grievance as well as the faculty member against whom the grievance has been filed. The chairperson of the subcommittee will provide copies of the grievance to both parties, answer any procedural questions that the parties have, and also ask each party if they have anything to add to the written record prior to the hearing. If additional written materials are submitted prior to the hearing, the chairperson of the subcommittee will distribute copies to all subcommittee members and to all parties to the grievance. The chairperson of the subcommittee will, to the extent possible, handle each case in a confidential manner.

9. Academic Grievance hearings shall convene at a standardized location and time, as defined by the Office of Undergraduate Studies. The hearing shall take place during the next available standard meeting time after the subcommittee has received the necessary materials.

10. The hearing on the grievance will be informal and shall be closed to the public. The Associate Dean of Undergraduate Studies shall, as facilitator, take whatever action is necessary to ensure an equitable, orderly and expeditious hearing. All parties to the grievance shall be given an opportunity to be heard. In addition, the chairperson may request the presence of any other person who can supply information pertinent to the grievance. Witnesses shall not be present during the hearing proceedings except when they are called to speak before the committee. The parties shall be permitted to question all individuals who are heard by the committee. If any witness is unable to be present at the hearing, the chairperson may, at his/her discretion, accept a written statement from that witness to be presented at the hearing. The parties shall be accorded the right to assistance of counsel of their own choice; however, counsel shall not be permitted to participate actively in the proceedings.

11. Upon conclusion of the hearing, the subcommittee shall reach, by majority vote, a posed solution to the grievance. The subcommittee chairperson

shall then formulate the findings in writing. Copies of the written findings and recommended solution will be forwarded to both parties to the grievance for acceptance. Each party will be asked to indicate acceptance of the posed solution within 14 calendar days of its date. Failure to respond within 14 calendar days will constitute acceptance. In the event that both parties agree to a change in grade, the Associate Dean of Undergraduate Studies will also notify the Office of Records and Registration of the decision.

12. If, after the conclusion of the hearing on the grievance, acceptance of the posed solution cannot be secured, the grievance shall be referred to the Dean of Undergraduate Studies. When grievances are referred in this manner, the Dean of Undergraduate Studies, on behalf of the University, shall make the final decision on the solution to the grievance and will then notify the student, the involved faculty member, the department chair of the involved faculty member, the involved collegiate Dean, and the Associate Dean of Undergraduate Studies of the University's final decision. In the event that the Dean of Undergraduate Studies decides in favor of a change in grade, the Dean of Undergraduate Studies will also notify the Office of Records and Registration of the University's decision.

13. To the extent permitted by law, the Associate Dean of Undergraduate Studies shall keep in confidence all records pertinent to grievances.

14. The Academic Grievance Committee shall make every reasonable effort to resolve each grievance by the end of the semester that follows the semester in which the student received the grade that is being contested (summers not included).

15. These procedures can be changed by the Academic Council. Such changes shall not affect any case under consideration at the time of the change. Notification of any changes to the procedure shall be given to the Dean of Undergraduate Studies of the University via the Academic Council.

## V. Supplementary Procedure for Graduating Seniors

The purpose of this supplementary procedure is to offer an expedited method for graduating students to file an academic grievance that would impact their ability to graduate, as determined by the Dean of Undergraduate Studies. To be eligible for the following procedure, the student must file an academic grievance with the Office of Undergraduate Studies no later than noon the day after final grades are posted. The following procedure shall be made available for Fall, Spring, and Summer graduations.

1. Any student filing an expedited grievance should first attempt to resolve it by consulting with the involved faculty member. Until a formal complaint is filed, the student may consult with the Undergraduate Student Ombudsman.

2. In the event that the student and faculty member cannot arrive at a resolution, the student may bring the grievance before the Academic Grievance Expedited Committee. The student must first meet with the Associate Dean in the Office of Undergraduate Studies. If the student wishes to proceed with the grievance, the student will provide a written statement and grievance checklist form (IV.2 above).

3. The student and involved faculty member shall be notified of the time and place of the hearing by 6:00 pm, two days prior to graduation. Hearings will

begin at 2:00 pm, one day prior to graduation. In the case that the involved faculty member cannot attend the hearing, he or she may appoint an appropriate representative.

4. Hearings shall follow the same format as established in IV. 10.

5. Following the hearing, the Academic Grievance Expedited Committee shall vote on a proposed resolution. A majority vote constitutes as a passed resolution. This decision is final, and the student and involved faculty member will be notified of the resolution. In the event that the Academic Grievance Expedited Committee decides in favor of a change in grade, the Dean of Undergraduate Studies will also notify the office of Records and Registration of the university's decision.

## ACADEMIC MISCONDUCT BY FORMER STUDENTS

It is possible that an act of academic misconduct will remain undiscovered until after a degree is awarded. In such a case, Clemson University reserves the right to revoke any degree based on new revelations about scholarly issues including, but not restricted to, admissions credentials, all forms of coursework, research, theses, dissertations, or other final projects.

### I. Submission of Fraudulent Admissions Credentials

The submission of fraudulent admissions credentials in the student's application or any other documents submitted for admission to Clemson University may result in initiation of action under the Policy and Procedure on Revocation of Academic Degrees.

### II. Academic Dishonesty in Coursework

A. In the event that the act is alleged to have occurred within the context of a course and is consistent with the general definition of academic dishonesty presented in Sections I of the Academic Integrity Policy, the same procedures in that policy will apply except for academic misconduct listed in III below.

B. Graduate Students—If the resulting penalty is either the assignment of a grade of *D* or *F* in a required graduate course, or the issuance of any grade that causes the student not to possess a cumulative *B* average in both graduate courses and in all courses, action under the Policy and Procedures on Revocation of Academic Degrees may be initiated.

C. Undergraduate Students—If the resulting penalty causes the student to no longer have the necessary credit hours, coursework, or grade average for receiving a degree, action under the Policy and Procedures on Revocation of Academic Degrees may be initiated.

### III. Falsification of Data and Plagiarism in Theses, Dissertations, or Other Final Projects

Data falsification, plagiarism (as defined in the Academic Integrity Policy) and other acts of academic dishonesty in a thesis, dissertation, or other final project are serious acts of misconduct. Allegations of this type of misconduct may result in initiation of action under the Policy and Procedure on Revocation of Academic Degrees.

## REVOCATION OF ACADEMIC DEGREES

### Preamble

Academic institutions have a critical responsibility to provide an environment that promotes integrity, while at the same time encouraging openness and creativity among scholars. Care must be taken to ensure that honest error and ambiguities of interpretation of scholarly activities are distinguishable from outright misconduct. This policy is applicable to fraudulent or other misconduct in obtaining an academic degree which is so egregious that a mechanism for revoking an academic degree, either graduate or undergraduate, must be undertaken. The Clemson University Board of Trustees has the sole authority to revoke any degree previously awarded.

### Definitions

As used herein, the following terms shall apply:

A. When the degree holder was an undergraduate student:

1. "Dean" shall mean the Dean of the academic college where student was enrolled.

2. "Committee of Investigation and Recommendation" shall be composed of the members of the standing University Undergraduate Academic Eligibility Appeals Committee. An undergraduate student will be appointed to the Committee of Investigation and Recommendation by the President of the Student Body within ten (10) calendar days of notification by the President of the Faculty Senate. Any member of the Academic Eligibility Appeals Committee who is a faculty member in the department which awarded the degree involved shall not be a member of the Committee of Investigation and Recommendation for that particular investigation. If there are fewer than three (3) non-disqualified faculty members, the President of the Faculty Senate shall appoint additional faculty members to bring the number of faculty committee members up to three (3). If the President of the Faculty Senate is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the additional member.

B. When the degree holder was a graduate student:

1. "Dean" shall mean the Dean of the Graduate School.

2. "Committee of Investigation and Recommendation" shall be composed of the members of the standing University Graduate Admissions and Continuing Enrollment Appeals Committee, except for the Associate Dean of the Graduate School who shall not be a member of the Committee of Investigation and Recommendation. A graduate student will be appointed to the Committee of Investigations and Recommendation by the President of Graduate Student Government within ten (10) calendar days of notification by the President of the Faculty Senate. Any member of the Graduate Admissions and Continuing Enrollment Appeals Committee who is a faculty member in the department which awarded the degree involved shall not be a member of the Committee of Investigation and Recommendation for that particular investigation. If there are fewer than three (3) non-disqualified faculty members, the President of the Faculty Senate shall appoint additional faculty members to bring the number of

faculty committee members up to three (3). If the President of the Faculty Senate is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the additional member.

### Complaint

An allegation or complaint involving the possibility of misconduct can be raised by anyone. The allegation should be made in writing to the Dean.

### Initial Review

The Dean will conduct the initial review to determine whether or not the allegation has merit. The Dean may discuss the matter with the former student's advisory committee (if any) and other faculty as appropriate. The Dean may also contact persons outside the University who may be able to provide factual information on the alleged misconduct or who may otherwise have expertise concerning issues involved in the alleged misconduct. If the Dean determines that the allegation has no merit, he/she will terminate the investigation. If the Dean determines that serious academic misconduct is suspected, the Dean will notify the President of the Faculty Senate in writing in a confidential manner. The Dean shall also notify the Vice President for Academic Affairs and Provost of the charge but will not discuss any details of the charge.

### Committee of Inquiry

The President of the Faculty Senate shall, within (10) calendar days of receipt of the notification from the Dean, appoint three (3) faculty members to the Committee of Inquiry and notify the President of Graduate Student Government or the President of the Student Body, as appropriate, who shall appoint a graduate or undergraduate student, as appropriate, to the Committee of Inquiry within ten (10) calendar days of notification. The President of the Faculty Senate shall also notify the degree holder of the formation of a Committee of Inquiry.

If the Faculty Senate President is from the same department that awarded the degree involved, the President-Elect of the Faculty Senate shall appoint the Committee of Inquiry. The faculty members will be appointed from departments which did not award the degree involved. The Committee will elect its chairman from the faculty members on the Committee.

For each allegation, the Committee of Inquiry will review the complaint and any other information provided by the Dean and determine whether there is sufficient evidence to warrant a formal charge of academic misconduct and further investigation under this policy. While the Committee of Inquiry shall not make a recommendation as to whether a degree should be revoked, the purpose is to provide a review to separate frivolous, unjustified or mistaken allegations from those requiring a more detailed and formal investigation. The Committee of Inquiry will review the evidence and must determine that the alleged misconduct more probably than not occurred in order for the committee to recommend a formal charge and further investigation.

Within thirty (30) calendar days of the formation of the Committee of Inquiry, the Committee of Inquiry will submit a written report to the President of the Faculty Senate. If the Committee of Inquiry's report

finds that the investigation should not proceed, the President of the Faculty Senate shall terminate the investigation and notify the appropriate persons. If the Committee of Inquiry's report finds that a formal charge and further investigation are warranted, the President of the Faculty Senate shall, within ten (10) calendar days of receipt of the report of the Committee of Inquiry, send a copy of that report to the Dean and to the Committee of Investigation and Recommendation. The President of the Faculty Senate shall also immediately notify the President of Graduate Student Government or President of the Student Body (whichever is appropriate) that a student representative needs to be appointed to the Committee of Investigation and Recommendation. The President of the Faculty Senate shall also notify the Vice President for Academic Affairs and Provost of the Committee of Inquiry's recommendation. No details of the charge will be discussed. *Note:* A majority vote of the Committee of Inquiry is necessary to recommend that a formal charge and further investigation are warranted. A tie vote means that the investigation is terminated as stated herein.

### Notification to Degree Holder

The Dean shall issue in writing, within ten (10) calendar days of receipt of the report of the Committee of Inquiry, a formal charge of academic misconduct to the degree holder. This written notice shall detail the factual allegations for the charge and the evidence supporting the charge. This written notice shall also inform the degree holder that if the charges are substantiated, the degree holder's degree could be revoked. This written notice shall also inform the degree holder of his/her right to appear at a hearing as stated in this policy. The Dean shall also send with this notice a copy of this Policy and Procedure on Revocation of Academic Degrees to the degree holder. This notice shall be delivered to the accused in person or sent by certified mail, return receipt requested.

### Committee of Investigation and Recommendation

The Committee of Investigation and Recommendation shall extend to the degree holder the following process:

1. Notice of the nature of the complaint
2. Notice of the evidence supporting the complaint
3. Notice of the hearing
4. The opportunity to present evidence, including testimony
5. The opportunity to hear the testimony against the degree holder
6. The opportunity to ask questions of all witnesses
7. The opportunity to have an attorney or advisor present at the hearing; however, the role of the attorney or advisor shall be solely to assist the party, and the attorney or advisor shall not be permitted to participate actively in the proceedings.

The degree holder shall not be entitled to know the identity of the person(s) who originally made the complaint unless that person agrees that his/her identity can be revealed.

The chair of the Committee of Investigation and Recommendation shall inform the degree holder of the time and date of the hearing.

The Dean or his/her designee shall present the accusation against the degree holder at the hearing and

may have one additional representative present during the hearing. Under this section the term "Dean" is understood to include the Dean's designee, if such a designation is made.

The degree holder and the Dean may submit written materials to the Committee of Investigation and Recommendation prior to the hearing. The chair of the Committee of Investigation and Recommendation shall make available the materials received to the other party and to all committee members.

The hearing before the Committee of Investigation and Recommendation shall be held no sooner than thirty (30) calendar days and no later than ninety (90) calendar days after receipt of the report of the Committee of Inquiry unless the degree holder and the Dean agree to a different date. All matters pertaining to the hearing shall be kept as confidential as possible and the hearing shall be closed to the public. A verbatim record of the hearing will be made and shall be made a part of the hearing record. The degree holder and the Dean shall be responsible for having any witnesses they wish to testify in attendance at the hearing. Witnesses will be present only while testifying.

The chair of the Committee of Investigation and Recommendation shall take whatever action is necessary during the hearing to ensure a fair, orderly, and expeditious hearing. No formal rules of evidence will be followed. If any objection is made to any evidence being offered, the decision of the majority of the committee shall govern. Irrelevant, immaterial, or unduly repetitious evidence shall be excluded.

The degree holder and the Dean shall be permitted to offer evidence and witnesses pertinent to the issues.

The Dean shall present the case against the accused first. The accused shall then present his/her response.

The chair will allow each party to ask questions of the other party and will allow each party to ask questions of the other party's witnesses at the appropriate time during the hearing as determined by the chair. Members of the committee may ask questions of any party or any witness at any time during the hearing.

Within fifteen (15) calendar days of the conclusion of the hearing, the Committee of Investigation and Recommendation shall submit a written report to the Vice President for Academic Affairs and Provost. The report shall contain findings and a recommendation as to whether the degree holder's degree should be revoked. The Committee of Investigation and Recommendation must find clear and convincing evidence that serious academic misconduct has been committed in order to recommend the revocation of the degree holder's degree. If the Committee of Investigation and Recommendation does not find clear and convincing evidence of serious academic misconduct, the Committee of Investigation and Recommendation cannot recommend revocation of the degree holder's degree and the matter shall be closed. *Note:* A majority vote of the Committee of Investigation and Recommendation is necessary to recommend the revocation of a degree holder's degree. This means that a tie vote will result in the matter being closed.

At the same time that the report is sent to the Vice President for Academic Affairs and Provost, the chair of the Committee of Investigation and Recommendation shall send a copy of the report to the degree

holder, the Dean, and other appropriate persons involved in the process.

If the Committee of Investigation and Recommendation recommends that the degree holder's degree be revoked, the chair shall also send a complete copy of the hearing record to the Vice President for Academic Affairs and Provost. The hearing record shall consist of the transcript of the hearing and all documents that were submitted to the committee. The chair of the Committee of Investigation and Recommendation shall label which documents were submitted by each party when forwarding this information to the Vice President for Academic Affairs and Provost.

If the Committee of Investigation and Recommendation recommends that the degree holder's degree be revoked, the chair shall also send a copy of the transcript of the hearing to the degree holder and the Dean at the same time that it is sent to the Vice President for Academic Affairs and Provost.

### **Vice President for Academic Affairs and Provost**

If the Committee of Investigation and Recommendation recommends that the degree be revoked, the Vice President for Academic Affairs and Provost shall review the hearing record and the report of the Committee of Investigation and Recommendation. If the Vice President for Academic Affairs and Provost decides that the degree holder's degree should not be revoked, he/she shall notify the degree holder, the Dean, the Committee of Investigation and Recommendation and other appropriate persons involved in the process, in writing, within twenty-one (21) calendar days of receipt of the transcript of the hearing, and the matter shall be closed. If the Vice President for Academic Affairs and Provost decides to recommend that the degree holder's degree should be revoked, the Vice President for Academic Affairs and Provost shall send that recommendation in writing to the President of the University within twenty-one (21) calendar days of receipt of the transcript of the hearing. The Vice President for Academic Affairs and Provost shall send to the President, along with his/her recommendation, the Committee of Investigation and Recommendation's report and the hearing record. The Vice President for Academic Affairs and Provost shall send a copy of his/her recommendation to the degree holder, the Dean, the Committee of Investigation and Recommendation, and other appropriate persons involved in the process.

If the Vice President for Academic Affairs and Provost is disqualified from reviewing the case, the Dean of Undergraduate Studies shall be substituted for the Vice President for Academic Affairs and Provost.

### **President**

If the Vice President for Academic Affairs and Provost recommends to the President that the degree holder's degree should be revoked, the President shall transmit that recommendation along with the report of the Committee of Investigation and Recommendation and the hearing record to the Executive Secretary of the Board of Trustees within thirty (30) calendar days of receipt. If the President wishes to make a recommendation, he/she shall review the recommendation of the Vice President for Academic Affairs

and Provost, the report of the Committee of Investigation and Recommendation, and the hearing record and forward his recommendation to the Executive Secretary of the Board of Trustees within thirty (30) calendar days of receiving the recommendation of the Vice President for Academic Affairs and Provost.

### **Board of Trustees**

The Executive Secretary of the Board of Trustees shall send to all trustees the hearing record, the recommendation of the Vice President for Academic Affairs and Provost, the report of the Committee of Investigation and Recommendation, and the recommendation of the President, if any. A majority vote by the Board of Trustees, at a duly constituted Board meeting, is required to revoke an academic degree. The decision of the Board of Trustees shall be final.

### **Guiding Principles**

All actions taken by committees shall be effective by a majority vote.

All investigations, hearings, and actions shall be kept as confidential as possible except for notice of any revocation approved by the Board of Trustees.

A decision not to proceed at any stage of the proceedings set forth in this policy does not necessarily mean that the original complaint was groundless.

For good cause shown, at the request of either party and the approval of the other, the Vice President for Academic Affairs and Provost shall extend any time limit set forth in this policy. Any such time extension shall be communicated in writing to all appropriate parties.

### **Administrative Action if Degree is Revoked**

If a degree is revoked by the Board of Trustees, the former student's transcript will be modified to reflect that the degree was revoked, and the former student will be informed of the revocation and requested to return the diploma. If the former student was enrolled in a program requiring a thesis or dissertation, all bound copies will be removed from the Clemson University Library. In addition, for doctoral students, University Microfilms, Inc. will be notified and requested to take appropriate action.

Students whose degrees have been revoked may be eligible to reapply for admission according to normal University procedures and policies in effect at the time of reapplication.

## GENERAL EDUCATION

An undergraduate student whose enrollment in a curriculum occurs after May 15, 2005, must fulfill the general education requirements in effect at that time. If a student withdraws from the University and subsequently returns or does not remain continuously enrolled (summers excluded), the requirements in effect at the time of return will normally prevail. Any variation in curricular or general education requirements shall be considered under the curriculum year change or the substitution procedure.

### MISSION STATEMENT

Academic institutions exist for the transmission of knowledge, the pursuit of truth, the intellectual and ethical development of students, and the general well-being of society. Undergraduate students must be broadly educated and technically skilled to be informed and productive citizens. As citizens, they need to be able to think critically about significant issues. Students also need to be prepared to complete undergraduate work and a major course of study. The mission requires a high level of knowledge about and competence in the following areas:

### General Education Competencies

#### A. Arts and Humanities

Demonstrate an understanding of the arts and humanities in historical and cultural contexts.

#### B. Mathematics

Demonstrate mathematical literacy through solving problems, communicating concepts, reasoning mathematically, and applying mathematical or statistical methods, using multiple representations where applicable.

#### C. Natural Sciences

Demonstrate scientific literacy by explaining the process of scientific reasoning and applying scientific principles inside and outside of the laboratory or field setting.

#### D. Social Sciences

Demonstrate an understanding of social science methodologies in order to explain the consequences of human actions.

#### E. Cross-Cultural Awareness

Demonstrate the ability to critically compare and contrast world cultures in historical and/or contemporary contexts.

#### F. Science and Technology in Society

Demonstrate an understanding of issues created by the complex interactions among science, technology, and society.

#### G. Communication

Effective oral and written communication is the means by which all competencies will be demonstrated.

#### H. Critical Thinking

Demonstrate the ability to assemble information relevant to a significant, complex issue, evaluate the quality and utility of the information, and use the outcome of the analysis to reach a logical conclusion about the issue.

#### I. Ethical Judgment

Demonstrate an ability to identify, comprehend, and deal with ethical problems and their ramifications in a systematic, thorough, and responsible way.

## REQUIREMENTS—33 credit hours

To meet general education competencies, 33 total credit hours are required, distributed as follows: I. General Education Coursework—31 credit hours; II. Distributed Coursework—2 credit hours; and III. Documentation of general education competencies, including examples of student work that document the student's achievement of general education competencies via an ePortfolio.

### I. General Education Coursework—31 hours required

General education requirements in some curricula are more restrictive than those shown below. Science and Technology in Society and Cross-Cultural Awareness requirements may be satisfied by other General Education courses, as indicated in the footnotes below, as long as the student completes a total of 31 hours in area I. and satisfies requirements A-F below:

#### A. Communication: at least 6 credits

**English Composition**..... 3 credits  
ENGL 1030 (ENGL 1020 for transfer students)

**Oral Communication**..... 3 credits  
COMM 1500, 2500, HON 2230, or an approved cluster of courses such as AS 3090, 3100, 4090, 4100, or ML 1010, 1020

\*May be satisfied either by the courses above or by an approved departmental cluster of courses; see II. Distributed Coursework. Students taking clusters must still earn at least 31 hours from the General Education Coursework list.

#### B. Mathematical, Scientific, and Technological Literacy: at least 10 credits

**Mathematics** ..... 3 credits  
MATH 1010, 1020, 1060, 1070, 1080, 2070, STAT 2220<sup>1</sup>, 2300, 3090, 3300. For Early Childhood Education, Elementary Education, and Special Education majors only, the approved cluster of MATH 1150, 1160 and 2160 satisfies the requirement.

**Natural Science with Lab**..... 4 credits  
ASTR 1010/1030, 1020/1040, BIOL 1030/1050, 1040/1060, 1090, 1100, 1110, 1200/1220, 1200/1230, CH 1010, 1020, 1050<sup>1</sup>, 1060<sup>1</sup>, GEOL 1010/1030, 1120<sup>1</sup>/1140, 2020, PHSC 1070, 1080, 1170, 1180, PHYS 1220/1240, 2070/2090, 2080/2100, 2210/2230, 2220/2240

**Mathematics or Natural Science** ..... 3 credits  
Any general education Mathematics or Natural Science course listed above or BIOL 2000<sup>1</sup>, 2010<sup>1</sup>, 2030<sup>1</sup>, 2040<sup>1</sup>, 2100<sup>1</sup>, 2200<sup>1</sup>, ENT 2000<sup>1</sup>, ENSP 2000<sup>1</sup>, GEOL 1200, 3000<sup>1</sup>, PES (ENSP) 3150<sup>1</sup>, PHYS 2400, 2450<sup>1</sup>, 2800, PLPA 2130<sup>1</sup>, STS 2160<sup>1</sup>

#### C. Arts and Humanities: at least 6 credits

**Literature** ..... 3 credits  
Any 2000-level ENGL literature course (ENGL 2020, 2120, 2130, 2140, 2150), CHIN 4010, FR 3000, 3040, GER 2600, 3060, 3600, 3610, HON 1900, 2210, ITAL 3010, 3020, JAPN 4010, 4060, RUSS 3600, 3610, SPAN 3110, 3130

**Non-Literature**..... 3 credits  
AAH 1010, 2100<sup>2</sup>, ART 3750, ASL 3050<sup>2</sup>, CAAH 2010, CHIN (PHIL) 3120, (PHIL) 3130, 4990, COMM 3030, 3080, 3090, 4020, ENGL (GW) 3010, 3550, 3570, (LANG) 4540, FR 3070, GW (ENGL) 3010, 4050, GER 3400, HON 1910, 2010<sup>1</sup>, 2030, 2100, 2220, HUM 3010, 3020, 3060, 3090<sup>2</sup>, JAPN 3070, 3080, LANG 3400, 3420, 3560, (ENGL) 4540, LARC 1160<sup>1</sup>, MUSC 2100<sup>2</sup>, 3080, 3090, 3110, 3120, 3130, 3140<sup>2</sup>, 3170, 3610, 3620, 3630, 3640, 3690, 3700, 3710, 3720, PHIL 1010, 1020, 1030, 1240<sup>1</sup>, 2100<sup>1</sup>, (CHIN) 3120, (CHIN) 3130, 3160, 3170, 3180, 3230, 3240<sup>1</sup>, 3250, 3260<sup>1</sup>, 3270, 3440, 3450<sup>1</sup>, REL 1010<sup>2</sup>, 1020<sup>2</sup>, 3010, 3020, 3030, 3060, 3070, 3120, 3130, 3150, RUSS 3400, SPAN 3070, 3080, STS 1010<sup>1</sup>, 1020<sup>1</sup>, 2150<sup>1</sup>, 3010<sup>1</sup>, 3030<sup>1</sup>, THEA 2100, 2790, 3080, 3090, 3150, 3160, 3170, WS 3010

**D. Social Sciences: at least 6 credits**

Selected from two different fields..... 6 credits  
 ANTH 2010<sup>2</sup>, APEC 2020, 2570, ECON 2000, 2110, 2120, GEOG 1010, 1030<sup>2</sup>, 1060, HIST 1010, 1020, 1220<sup>1</sup>, 1240<sup>1</sup>, 1720<sup>2</sup>, 1730<sup>2</sup>, 1930<sup>2</sup>, HON 1920, 2020, 2200, PAS 3010<sup>2</sup>, POSC 1010, 1020<sup>2</sup>, 1030, 1040<sup>2</sup>, PSYC 2010, 2500<sup>2</sup>, 2750<sup>1</sup>, RS 3010, SOC 2010, 2020

Note: APEC and ECON are considered the same field.

NOTE: Science and Technology in Society and Cross-Cultural Awareness requirements may be satisfied by other General Education courses, as indicated in the footnotes below, as long as the student completes a total of 31 hours in area I.

**E. Cross-Cultural Awareness: at least 3 credits**

AAH 1020, 2100, ASL 3050, ANTH 2010, APEC 2050<sup>1</sup>, CAAH 2010, GEOG 1030, HIST 1720, 1730, 1930, HON 1930, 2090, HUM 3090, IS 1010, 2100, LANG 2500, 2540, MUSC 2100, 3140, PAS 3010, POSC 1020, 1040, PSYC 2500, REL 1010, 1020, WS 1030, or through a University-approved cross-cultural experience

**F. Science and Technology in Society: at least 3 credits**

AGED (EDF) 4800, APEC 2050<sup>2</sup>, (ECON) 4570, AVS 3150, 4150, BIOL 2000, 2010, 2030, 2040, 2100, 2110, 2200, 4730, CH 1050, 1060, COMM 1070, 3070, CTE 1150, 2210, ECE 1010, ECON 3190, (APEC) 4570, EDF (AGED) 4800, ENR 3120, (FOR) 4160, ENSP (GEOL) 1250, 2000, (PES) 3150, 4000, ENGL 3490, ENT 2000, FDSC 2140, FOR (ENR) 4160, GEOL 1120, 1200, (ENSP) 1250, 2700, 3000, HCG (NURS) 3330, HIST 1220, 1240, 3210, 3230, 3920, 4240, 4910, HLTH 4310, HON 1940, 2010, 2060, IE 4880, LARC 1160, MKT 4450, MSE 1010, MUSC 3180, NURS 1400, (HCG) 3330, NUTR 2030, 2100, PES (ENSP) 3150, PHIL 1240, 2100, 3240, 3260, 3280, 3400, 3450, PHYS 2450, PKSC 3680, PLPA 2130, PRTM 2110, PSYC 2750, RS (SOC) 4010, SOC (RS) 4010, 4030, STAT 2220, STS 1010, 1020, 1200, 1710, 2150, 2160, 3010, 3030, 4980, 4990

<sup>1</sup>This course also satisfies the Science and Technology in Society Requirement.

<sup>2</sup>This course also satisfies the Cross-Cultural Awareness Requirement.

**II. Distributed Coursework: 2 credits****A. Academic and Professional Development: at least 2 credits**

Departmental courses approved by the Undergraduate Curriculum Committee addressing the general academic and professional development of the student.

**B. Distributed Competencies Coursework**

Courses in general education and the disciplines incorporate critical thinking, ethical judgment, and both written and oral communication skills into the curriculum. Some curricula use a cluster of courses to meet the oral communication competency.

**III. Documentation of General Education Competencies**

Students must provide appropriate documentation of achievement of their General Education competencies as outlined above. The documentation is provided through an ePortfolio. Students should include an example of their best work in each of the following eight areas: arts and humanities, mathematics, natural science, social science, cross-cultural awareness, science and technology in society, ethical judgment, and critical thinking. Excellent communication is an overarching competency and should be demonstrated in every ePortfolio artifact.

**General Education Summary**

1. Total of 33 credit hours fulfilled as stated above between General Education Coursework and Distributed Coursework

2. Completion and approval of an ePortfolio

For more information and instructions about ePortfolio, visit:

<http://www.clemson.edu/academics/programs/eportfolio/index.html>

## MINORS

A minor consists of at least 15 semester hours, with no fewer than nine credits at the 3000 level or higher. A student cannot major and minor in the same field or acquire a minor that is not allowed by the degree program. In programs that require a minor, courses may not be used to fulfill both the major and minor requirements. Courses that count towards a student's major, but are outside the major's course rubric, may also be used to fulfill minor requirements. Students are encouraged to contact the department offering the minor for advising. Specific requirements are detailed below.

Note: Some courses in the minors have prerequisite courses. Students should select a minor and take any prerequisites as early as possible in their academic careers.

### Accounting

A minor in Accounting requires ACCT 2010, 2040, 3110, 3120, and nine hours selected from 3000- or 4000-level accounting courses. Students planning to pursue the Master of Professional Accountancy degree program should select courses in consultation with the school's graduate coordinator.

### Adult/Extension Education

A minor in Adult/Extension Education requires AGED 4030, 4400, and nine additional credits selected from the following: AGED 4070, 4280, EDF (AGED) 4820, PRTM 3080.

### Aerospace Studies

A minor in Aerospace Studies requires AS 1090, 1100, 2090, 2100, 3090, 3100, 4090, and 4100. Completion of AS Leadership Laboratory and participation in cadet activities are mandatory. Students must compete for an allocation and be accepted into the Professional Officer Course before enrolling in AS 3090.

### Agricultural Business Management

A minor in Agricultural Business Management requires APEC 3020, 3090, 3190, and at least two courses selected from APEC 3510, 4020, 4080, 4090, 4520, 4560, 4600.

### Agricultural Mechanization and Business

A minor in Agricultural Mechanization and Business requires six credit hours selected from AGM 2050, 2060, 2210, 3010, 3030, AGED 3030; and nine credit hours from AGM 4020, 4050, 4060, 4100, 4520, 4600, 4720.

### American Sign Language Studies

A minor in American Sign Language Studies requires 15 credit hours in ASL at the 3000 or 4000 level.

### Animal and Veterinary Sciences

A minor in Animal and Veterinary Sciences requires AVS 1500 and 1510; one course selected from AVS 2000, 2010, 2030, 2040, 2060, 2090, 2110, 3020, 3090, 3110, 3230, 4050, or 4550; and nine additional hours selected from any 3000- or 4000-level AVS courses. A maximum of three credits of AVS 3600, 3900, 4410, 4420, 4430 or 4910 may be used.

### Anthropology

A minor in Anthropology requires ANTH 2010 and at least six hours selected from ANTH 3010, 3310, (BIOL) 3510, LANG (ANTH) 3710. Nine additional hours may be selected from any other Anthropology course, but at least three hours must be from a 4000-level course. No more than three credits of ANTH 4960 may be counted toward the minor.

### Architecture

A minor in Architecture requires ARCH 1010, 4710, 4720, and DSGN 3700. ARCH 4710, 4720, and DSGN 3700 are only offered during the summer at study abroad locations.

### Art

A minor in Art requires ART 1030, 1510 or 1520, AAH 1010, 1020 or 2100; at least nine hours of ART or AAH courses at the 2000 level or above; and at least three hours of ART or AAH courses at the 3000 or 4000 level.

### Athletic Leadership

A minor in Athletic Leadership requires 17 credit hours arranged as follows: AL 3490, 3500, 3530, 3610, 3620, 3760, and one of the following: AL 3710, 3720, 3730, 3740, 3750, 3770. Students must complete a coaching internship or athletic administrative internship (AL 4000) with the approval of the Athletic Leadership Coordinator.

### Biochemistry

A minor in Biochemistry requires three credits of GEN 3000 or 3020, three credits of BCHM 3010 or 3050 and nine credits of 4000 level Biochemistry courses.

### Biological Sciences

A minor in Biological Sciences requires BIOL 1030/1050, 1040/1060, or BIOL 1100 and 1110 and 12 additional credits selected from BIOL courses at the 3000 level or above, BCHM 3050, GEN 3000, or MICR 3050.

### Business Administration

A minor in Business Administration requires ACCT 2010, ECON 2110, 2120, FIN 3060, LAW 3220, MGT 2010, MKT 3010.

### Chemistry

A minor in Chemistry requires CH 1010, 1020, and 15 additional credits in Chemistry, at least nine of which must be at the 3000 or 4000 level, selected in consultation with the Department of Chemistry.

### Cluster

The Cluster minor allows students a somewhat wider choice of course materials than is possible with the conventional subject-matter minor. The general requirement for the Cluster minor is 15 credits in courses numbered higher than 3000, except where noted differently, chosen according to one of the plans below. Courses within the student's major area may not be included in the Cluster minor.

*Group I—Social Sciences:* anthropology, economics, geography, history, political science, psychology, sociology

*Group II—Life Sciences<sup>1</sup>:* biochemistry, biological sciences, genetics, microbiology

*Group III—Physical Sciences<sup>1</sup>:* chemistry, geology, physics

*Group IV—Engineering<sup>1</sup>:* courses in all engineering majors plus engineering mechanics and engineering graphics

<sup>1</sup>No course in the 1000 series is acceptable toward the minor and not more than six hours in the 2000 series are acceptable.

### Communication Studies

A minor in Communication Studies requires completion of one of the following options:

*General—COMM 2010* (with a C or better) and 12 additional credits in communication studies at the 3000 level or higher.

*Sports Communication—COMM 2010* (with a C or better) and 12 additional credits in sports communication (choose from COMM 3240, 3250, 3260, 3270, 4250, 4260, 4270, or 4280).

### Computer Science

A minor in Computer Science requires CPSC 2120 and 12 additional credits in computer science of which at least nine credits must be at the 3000 level or higher.

### Crop and Soil Environmental Science

A minor in Crop and Soil Environmental Science requires PES 1040, 2020, and nine or more PES credits at the 3000 level or higher.

### Digital Production Arts

A minor in Digital Production Arts requires DPA 3070 and completion of one of the following options:

*Group I (for Architecture or Visual Arts majors)—DPA 4000, 4010* and six credits selected from CPSC 4040, 4050, 4160, PKSC 2200, 3200, THEA 2880, 4870, 4970.

*Group II (for Computer Science, Computer Engineering, and Computer Information Systems majors)—DPA 4020, 4030,* and six credits selected from ART 2050, 2130, 4210, GC 3400, PKSC 2200, 3200, THEA 2880, 4870, 4970.

*Group III (for all other majors)—DPA 4000, 4010, 4020,* and three credits selected from CPSC 4040, 4050, 4160, PKSC 2200.

## East Asian Studies

A minor in East Asian Studies requires 15 credits, of which at least six credits must be at the 4000 level, distributed as follows: three credits from Group I, six additional credits selected from Group I or from Group II, and six credits from Group III:

*Group I*—CHIN (ANTH) 4180, HIST 3340, JAPN (ANTH) 4170, POSC 3720

*Group II*—HIST 3300, 3330, PHIL (CHIN) 3120, (CHIN) 3130, POSC 4720, 4770, REL 3140, or any other approved courses selected from department list

*Group III*—EAS 1230, JAPN 4010, 4990, any Chinese or Japanese language course, or any other approved courses selected from department list

Courses in Groups II and III must represent a combination of Chinese and Japanese courses.

## Economics

A minor in Economics requires ECON 3140, 3150, and nine additional credits from economics courses numbered 3000 or higher.

## Education

A minor in Education requires EDF 3010, 3020, 3340 or 3350, EDSP 3700, and three hours from any AL, CTE, EDC, NURS, PRTM, PHIL, POSC, PSYC, or SOC course at the 2000 level or higher. This minor does not meet the requirements for teacher certification and is not intended for persons who plan to teach in grades K–12.

## English

A minor in English requires 15 credits in English above the sophomore level, arranged as follows:

*Shakespeare*—ENGL 4110

*British*—Three credits from ENGL 3960, 3970, 4070, 4080, 4100, 4140, 4150, 4160, 4170, 4180, 4330, 4440

*American*—Three credits from ENGL 3980, 3990, 4200, 4210, 4250, 4260, 4550

*Electives*—Six additional credits above the sophomore level, including at least three credits from the 4000 level

## Entomology

A minor in Entomology requires ENT (BIOL) 3010 and 12 credits in entomology courses at the 3000 level or higher.

## Entrepreneurship

A minor in Entrepreneurship consists of 15 credits including the following: ELE 3010 and MGT (ELE) 3150. Nine credit hours from the following courses are also required: ECON (ELE) 3210, ELE 4010, 4990, MGT 4970, MKT (ELE) 3140, MKT 4200, 4250, 4260, 4270, 4280, 4290, 4300, SOC (ELE, POSC, PSYC) 3560.

Note: Not open to business majors, except those pursuing a BA in Economics.

## Environmental Science and Policy

A minor in Environmental Science and Policy requires at least 18 credits including ENSP 2000, 4000, and at least 12 credits from the following:

*Group I—Science and Engineering*: at least six credits selected from BIOL 4100, 4410, 4420, 4430, 4460, CH 4130, EES 4010, 4020, 4300, 4850, ENT 3000, ETOX 4000, 4210, 4300, FOR 2060, PES 2020, (BE) 4080, 4900, WFB 4140

*Group II—Resource Management*: at least two credits selected from APEC 3570, BE 4640, ECON 3190, EES (BE) 4840, FOR 3150, 4060, GEOL 3000, MSE 4330, PES (ENSP) 3150, WFB 3060, (BIOL) 3130, 3500, 4120, 4620

*Group III—Environmental Policy and Social Impacts*: at least two credits selected from ENSP 4720, HIST 3920, HLTH 4310, PHIL 3450, RS (SOC) 4010, WFB 4300

## Equine Industry

A minor in Equine Industry requires AVS 1500 and 1510; three hours from any 3000- or 4000-level AVS courses; and eight additional hours from AVS 2040, 2050, 2080, 3090, 3850, 4120, 4160, or 4170.

## Film Studies

A minor in Film Studies requires 15 credits in ENGL at or above the sophomore level, arranged as follows: ENGL 3480, 3570, 4500, (COMM) 4510, 4520, and one of the following: ART 2130, 3130, ENGL (THEA) 4300, ENGL 4530, 4590, 4850, or other course approved by the departmental Director of Undergraduate Studies.

## Financial Management

A minor in Financial Management requires FIN 3050, 3070, 3080, 3120; and either FIN 3060 or 3110.

## Food Science

A minor in Food Science requires FDSC 2140, 4010, and nine additional credits in FDSC or NUTR courses numbered 3000 or higher.

## Forest Products

A minor in Forest Products requires 15 credits, which must include at least four courses selected from FOR 3410, 4000, 4410, 4420, 4440, 4470. Other courses at the 3000 level or above may be selected with a Forest Products advisor's approval.

## Forest Resource Management

A minor in Forest Resource Management requires FOR 2050, 2060, 3050, and at least seven additional credits of forestry courses at the 3000 level or higher, excluding FOR 3000, 4000, 4190, 4470.

## Genetics

A minor in Genetics requires three credits of GEN 3000 or 3020, three credits of BCHM 3010 or 3050, and nine credits of 4000 level Genetics courses.

## Geography

The Geography minor consists of three credits of geography at the 1000 level and 15 credits of geography at the 3000 or 4000 level. At least one 4000-level geography course must be taken. One of the following courses may be taken as part of the 15-credit, upper-level requirements but may not be substituted for the required 4000-level geography course: BIOL 4420, SOC 4710.

## Geology

A minor in Geology requires GEOL 1010/1030, 2020, and 12 additional credits in geology, at least nine of which must be drawn from 3000–4000-level geology courses.

## Global Politics

A minor in Global Politics requires POSC 1020 or 1040; 3610; and 12 additional credits chosen from the list below. At least three of these credits must be from Group I and at least three credits from Group II:

*Group I—Comparative Politics*: POSC 3710, 3720, 4660, 4710, 4720, 4730, 4760, 4770, 4780, (LANG) 4850

*Group II—International Relations*: POSC 3620, 3630, 3670, 3750, 4280, 4290, 4480, 4560, 4570, 4590, 4610

With the approval of the Political Science department chair, a maximum of three credits from POSC 3050, 3110, 3130, (SPAN) 3820, (FR) 3830, or 4100 also may be applied toward a Global Politics minor. Students majoring in Political Science may not minor in Global Politics.

## Great Works

The Great Works minor requires GW (ENGL) 3010 plus one course from each of the following groups. A minimum of nine credits must be at the 4000 level.

*Group I—Classical Civilization*: Three credits from ENGL 4030, (THEA) 4290, (COMM) 4910, HIST 3540, 3550, 4500, PHIL 3150

*Group II—Post-Classical Literature*: Three credits from ENGL 4080, 4110, 4140, 4160, FR 4000, GW 4030, SPAN 3130, 4010

*Group III—Philosophy, Religion, and Social Thought*: Three credits from ENGL 3500, HIST 4950, PHIL 3160, 3170, POSC 4500, REL 3010, 3020, 4010

*Group IV—The Arts*: Three credits from AAH 4230, 4240, HUM 3010, 3020, MUSC 4150, 4160, THEA 3150, 3160

*Group V—The Sciences*: BIOL 4860, ENGL 4340, GW 4020, 4050

## History

A minor in History requires 15 credits in history at the 3000 and 4000 level. Three credits at the 4000 level must be included.

## Horticulture

A minor in Horticulture requires HORT 1010 and 12 additional credits of horticulture courses (excluding HORT 4080 and 4710), nine credits of which must be at the 3000 level or higher. HORT 2710 is highly recommended.



### Human Resource Management

A minor in Human Resources Management requires 15 credit hours, including MGT 3070, 4000, 4310 and 4350, and three additional credit hours selected from MGT 4160 or 4250.

### International Engineering and Science

The minor in International Engineering and Science, open to students in any major in the College of Engineering and Science, requires

1. Completion of a foreign language through at least 2020 and
2. Either (a) nine credits of engineering or science courses at the 3000 level or higher transferred from a foreign institution during an approved study abroad program of at least three months or (b) an approved international internship or research program in engineering or science of at least three months duration, plus nine credits chosen from the following list: 3000-level or higher foreign language courses; ECON 3100, 4120, 4130; POSC 3610, 3620, 3710, 3750, 4720, 4770, 4780.

The international study, internship, or research program must be approved in advance by the Associate Dean for Undergraduate Studies of the College of Engineering and Science.

### Legal Studies

A minor in Legal Studies requires 15 credits at the 3000-4000 level, with at least six credits selected from Group I, at least six credits selected from Group II, and the remaining three credits selected from either group at the student's option<sup>1</sup>:

*Group I*—HIST 3280, 3290, 4960, PHIL 3430, POSC 4370, 4380, SOC 3880

*Group II*—ECON 4020, LAW 3220, 3330, 4050, 4200, 4990

<sup>1</sup>Additional courses may be approved by a committee composed of representatives selected by the Dean of the College of Architecture, Arts and Humanities and by the Dean of the College of Business and Behavioral Science.

### Management

A minor in Management requires 15 credits as follows: MGT 2010, 3070, 3100, 3180, 3900.

### Management Information Systems

A minor in Management Information Systems requires 15 credits as follows: ACCT 3220 or MGT 3180; MGT 4110, 4520, and two of the following: MGT 3120, 4540, 4550, 4560.

### Mathematical Sciences

A minor in Mathematical Sciences requires MATH 2080 and 12 additional credits in MATH or STAT courses numbered 3000 or higher, excluding MATH 3080, 3150, 3160, 3820, 3990, 4080, 4300, 4320, 4810, 4820, 4910, 4920, and 4990, and STAT 3090.

### Microbiology

A minor in Microbiology requires MICR 3050 and 11 additional credits selected from 4000-level microbiology courses.

### Military Leadership

A minor in Military Leadership requires at least 15 credits, including ML 3010, 3020, 4010, 4020, and one of the following: HIST 3900, ML 3900, POSC 4580, or POSC 6580. Completion of Leadership Laboratory and participation in cadet activities are mandatory. (ML 1000 and 2000 levels may be taken concurrently in the sophomore year.)

### Modern Languages

A minor in Modern Languages requires 15 credits from one modern language (Chinese, French, German, Italian, Japanese, or Spanish) from courses at the 3000 and 4000 levels, including at least one literature course at the 4000 level. In French, one of the 3000-level courses must be FR 3050. FR 4380 and 4390, JAPN 4010, (ANTH) 4170, 4990, and SPAN 4380 and 4390 may not be used to satisfy requirements for the French, Japanese, or Spanish minor.

### Music

A minor in Music requires MUSC 1420, 1430, 1510, 1520, 2510, 2520; 4150 or 4160; four semesters of ensemble, totaling four credits, selected from MUSC 3230, 3610, 3620, 3630, 3690, 3700, 3710, 3720; and one three-hour MUSC course at the 3000-4000 level. All four semesters of applied music and large ensemble must be on the student's primary instrument.

### Natural Resource Economics

A minor in Natural Resource Economics requires APEC 3570, 4570; and three courses selected from APEC 3520, 4090, 4120, 4210, 4520, 4750, ECON 3190.

### Nonprofit Leadership

A minor in Nonprofit Leadership requires NPL 3000, 3900, 4900, and one course selected from each of the following areas:

*Group I*—COMM 3480, 4800, PRTM 3080

*Group II*—EDF 3340, 3350, PSYC 3400, SOC 3500

*Group III*—HLTH 4010, MKT 4280, 4290, PRTM 4210

*Group IV*—MGT 3070, POSC 4270, PSYC 3680

*Group V*—HLTH 4400, PHIL 3440, POSC 3210, PRTM 3050, 3210

### Packaging Science

A minor in Packaging Science requires PKSC 1020, 2020, 2040, and 2060; and at least nine credits selected from the following: FDSC 4010, 4020, FOR 4410, 4420, GC 4060, PKSC 3200, 3680, 4010, 4040, 4160, 4200, 4300, 4400, 4540, 4640.

### Pan African Studies

A minor in Pan African Studies requires 18 credits as follows: HIST 3110 or 3120, PAS 3010, and 12 credits arranged as follows:

*Group I*—Three credits from GEOG 3300, HIST 3370, 3380, 3390, 4380, PAS 1010, 4980

*Group II*—Three credits from ENGL 4820, 4830, POSC 3810, SOC 4600, THEA 3170

*Group III*—Three credits in any 3000-4000-level course in the social sciences approved by the Director of the Pan African Studies Program

*Group IV*—Three credits in any 3000-4000-level course in the humanities approved by the Director of the Pan African Studies Program

Courses are to be scheduled in consultation with the appropriate advisors. Pan African Studies advisors will provide all affected advisors with a list of approved courses prior to registration.

### Park and Protected Area Management

A minor in Park and Protected Area Management requires PRTM 2700, 4740 and nine additional credits from PRTM 3200, 3210, 3300, 4030, (GEOG) 4300, 4310.

### Philosophy

A minor in Philosophy requires 15 credits in philosophy, nine of which must be at the 3000 level or above.

### Physics

A minor in Physics requires PHYS 1220, 2210, 2220, and nine additional credits in physics courses at the 3000 level or higher.

### Plant Pathology

A minor in Plant Pathology requires PLPA 3100 and 12 credits from the following: BIOL (PLPA) 4250, (PLPA) 4260, IPM 4010, MICR 3050, or any 3000-4000-level PLPA courses.

### Political Science

A minor in Political Science requires POSC 1010 or 1020 or 1030 or 1040 and 15 additional credits at the 3000-4000 level, nine of which must be selected from three different fields of political science as follows:

*American Politics*—POSC 4030, 4050, 4160, 4360, 4420

*Comparative Politics*—POSC 3710, 3720, 4660, 4710, 4760, 4770, 4780

*International Relations*—POSC 3610, 3620, 3630, 3750, 4290, 4480

*Political Theory*—POSC 4490, 4500, 4530, 4550

*Public Policy and Public Administration*—POSC 3020, 3210, 4210, 4230, 4240, 4270, 4300

At least one 4000-level course must be included. No more than a total of three credits from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied to the requirements for a Political Science minor.

### Psychology

A minor in Psychology requires PSYC 2010 and 15 credits from PSYC 2750 and/or 3000- and 4000-level psychology courses. At least nine hours from courses other than PSYC 4970 and 4980 must be taken.

### Public Policy

A minor in Public Policy requires POSC 3210, 4210, and 4300, plus nine credit hours in courses dealing with specific policy domains and approved by the Department of Political Science.

### Recreational Therapy

A minor in Recreational Therapy requires PRTM 2600, 3220, 3240, 3260, and 3270.

### Religion

A minor in Religion requires 15 credits, nine of which must be at the 3000 level or above. PHIL 3030 and POSC 4070 may be included.

### Russian Area Studies

A minor in Russian Area Studies requires 15 credit hours of which three credits must be in Russian language courses at the 2000 level or above. The remaining twelve credits are distributed as follows:

*Group I*—Three credits from RUSS 3070, 3400, 3600, 3610, 3980, 4600

*Group II*—Three credits from HIST 3850, 3860, 3870, 4940

*Group III*—Three credits from POSC 4710, 4730

*Group IV*—Three additional credits from any of the courses listed above

### Science and Technology in Society

A minor in Science and Technology in Society requires 15 credits, at least six of which must be at the 4000 level. See History Department advisor for list of approved courses.

### Screenwriting

A minor in Screenwriting requires 15 credits in ENGL above the sophomore level as follows: ENGL 3570, 4480 (six credits); and one of the following: ENGL 4500, (COMM) 4510, 4520, 4530, THEA (ENGL) 3470, or other course approved by the departmental Director of Undergraduate Studies.

### Sociology

A minor in Sociology requires SOC 2010 and 15 credits from sociology and rural sociology courses numbered 3000 or higher. At least one 4000-level course must be included.

### Spanish-American Area Studies

A minor in Spanish-American Area Studies requires the equivalent of SPAN 2020, ECON 4100, and 12 credits distributed as follows: six credits from GEOG 3400, HIST 3400, 3410, 3420, 4400; and six credits from POSC (SPAN) 3820, SPAN 3080, 3110, 4030, 4220, 4350.

### Sustainability

A minor in Sustainability requires 18 credits, including CU 2010; three credits of approved engagement activities, such as creative inquiry, study abroad, independent research, co-ops, or capstone projects; and 12 credits of courses that focus on sustainability issues, selected from APEC 4570\*, ARCH 3700\*, 4710\*, 4720\*, BE 4400, 4640, BIOL 2040\*, 3130, 4410, CE 4360, 4370, ECE 4200, 4610, 4570, ECON 3190, EES 4860, ENR 4130, 4500\*, ENSP 2000, 4000\*, FOR 4340, GEOL 1200, 2700\*, HIST 1240\*, HON 2060 (when the course covers sustainable energy innovation or experimental forest topics), HORT 1010, 3080, 4560, ME 4200, 4570, PES 3150\*, PHIL 3450\*, PHYS 2450, PKSC 3680\*, RS 4010\*, WFB 3130, 4180, 4300. Other courses may be substituted with departmental approval.

At least nine credits must be selected from 3000- or 4000-level courses. At least three and no more than nine credits must be from courses addressing the social dimension of sustainability. These courses are identified by an asterisk in the list above.

### Theatre

A minor in Theatre requires 20 credits arranged as follows: three credits of dramatic literature and history (ENGL) 4100, 4110, (ENGL) 4290, (THEA) 4300; THEA (ENGL) 3470; three credits of theatre history (THEA 3150, 3160, 3170, 3180); six credits in a sequence (THEA 2780/4790, THEA (ENGL) 3470/4470, THEA 3720/4720, 3760/4760; 2880 or 3770 and one of the following: 4770, 4870 or 4970); six credits in THEA at the 3000-4000 level; and two credits of THEA 2790.

### Travel and Tourism

A minor in Travel and Tourism requires PRTM 3010, 3420, and nine additional credits from PRTM 3430, 3440, 3490, 3920, 3980; (GEOG) 4300, 4410, 4440, 4450, 4460, 4470, 4980.

### Turfgrass

A minor in Turfgrass requires HORT 2120, 4120, PES 2020, and two of the following: AGM 4020, HORT (PES) 4330, PLPA (ENT) 4060.

### Urban Forestry

A minor in Urban Forestry requires a minimum of 16 credits, distributed as follows:

*Group I*—FOR (HORT) 4270, 4500, 4800, HORT 2080

*Group II*—A minimum of three credits selected from CRP 4010, HORT 3080

*Group III*—A minimum of three credits selected from ENT 4010 or HORT 3030

### Wildlife and Fisheries Biology

A minor in Wildlife and Fisheries Biology requires WFB 3000; 3500; and nine additional hours selected from 3000-level or higher WFB courses, except 4630.

### Women's Studies

A minor in Women's Studies requires 15 credits at the 3000 and 4000 level, distributed as follows:

*Group I*—Six credits: WS 3010 and any 4000-level WS course

*Group II*—Six credits from courses that deal entirely with women and gender issues: COMM 4550, ENGL 3800, HIST 3180, PHIL (WS) 3490, PSYC 4080, SOC 4610, SPAN 4030, and any additional courses approved for Group II

*Group III*—Three credits may be earned by taking any approved Women's Studies minor course.

Courses selected in Groups II and III must represent at least two disciplines. Courses are to be scheduled in consultation with the appropriate advisor. The Women's Studies Director will provide all affected advisors with a list of approved courses prior to registration each semester.

### Writing

A minor in Writing requires 15 credits as follows:

*Business and Technical Option*—APEC 3510 or GC 1040, CPSC 1200, ENGL 3040 or 3140, 4900, 4950

*Media Studies Option*—ENGL 2310, 3320, 3330, 4780; and one of the following: ENGL 4750, 4890, (COMM) 4910, (COMM) 4920, or any course approved by the Chair of the English Department  
*Writing Pedagogy Option*—ENGL 3120, 4000, 4010, (EDSC) 4850, and any 3000- or 4000-level writing course offered by the Department of English

*Creative Writing Options*

*Drama*—ENGL (THEA) 4300, THEA (ENGL) 3470, (ENGL) 4470 (six credits), and one of the following: ENGL 3120, 4100, 4110

*Fiction*—ENGL 3450, 4320, 4450 (six credits), and one of the following: ENGL 3120, 4180, 4250, 4260, 4280

*Poetry*—ENGL 3460, 4310, 4460 (six credits), and one of the following: ENGL 3120, 4160, 4170, 4280, 4440

# COLLEGE OF AGRICULTURE, FORESTRY AND LIFE SCIENCES

The College of Agriculture, Forestry and Life Sciences (CAFLS) supports Clemson University's land-grant mission to provide education, research and service to the public. The College of Agriculture, Forestry and Life Sciences serves more than 3,800 graduate and undergraduate students.

The College of Agriculture, Forestry and Life Sciences will be a new model for a 21st Century, multi-disciplinary college of life-based sciences that prepares students to be leaders and innovators in their chosen careers. The shared biological foundation of the CAFLS Departments and School will stimulate student learning and undergraduate research across disciplines; will increase opportunities for team-based faculty research across departments, colleges and institutions; and will make available the latest scientific knowledge for the greater benefit of society.

To assist students in achieving these goals, the William B. Bookhart Jr. Student Services Center provides academic advising and developmental services to promote success for students in the related degree programs. These services involve recruitment and retention, academic advising, multicultural affairs, study abroad, career development, and placement.

The College of Agriculture, Forestry and Life Sciences is impacting the world one graduate at a time—from cell research to food production to packaged materials to the globe—developing partnerships for the future to make the world greener, healthier, tastier, and wealthier.

## AGRIBUSINESS Bachelor of Science

The Agribusiness curriculum provides strong training in economic and business principles as applied in agribusiness enterprises. Core classes in the major focus on agribusiness economics and management, leadership, marketing and sales, finance, accounting, and business skill development. Employment opportunities for graduates are many and diverse. Private sector opportunities include national and international careers in agribusiness management, banking, finance, sales, marketing, and public relations. Public sector opportunities include positions in organizations that promote food, agriculture, and natural resource interests; government agencies; and educational institutions. Moreover, the curriculum design provides graduates with the skills necessary to successfully establish their own businesses. By completing this curriculum, graduates will have fulfilled the requirements for an approved minor in the college, allowing students to tailor the program to meet specific career objectives.

The curriculum also emphasizes training on globalization, information technology, and interdisciplinary skills needed to analyze the complex interrelationships between business, the environment and society. Students are encouraged to participate on a creative inquiry student research team and to take advantage of an internship and/or study abroad opportunity. The program provides an excellent background for professional or graduate study in several disciplines.

### Freshman Year

#### First Semester

- 3 - APEC 2050 Agriculture and Society
- 3 - MATH 1020 Intro. to Mathematical Analysis
- 3 - STAT 2220 Statistics in Everyday Life
- 4 - Natural Science Requirement<sup>1</sup>
- 3 - Oral Communication Requirement<sup>1</sup>

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#### Second Semester

- 3 - APEC 2020 Agricultural Economics
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Elective

15

### Sophomore Year

#### First Semester

- 3 - ACCT 2010 Financial Accounting Concepts
- 3 - APEC 3020 Economics of Farm Management
- 3 - ECON 2120 Principles of Macroeconomics
- 3 - MGT 2010 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>

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#### Second Semester

- 3 - ACCT 2020 Managerial Accounting Concepts
- 3 - APEC 3570 Natural Resource Economics
- 3 - Leadership Requirement<sup>2</sup>
- 3 - Minor Requirement<sup>3</sup>
- 3 - Social Science Requirement<sup>1</sup>

15

### Junior Year

#### First Semester

- 3 - AGM 3190 Agribusiness Decision Analysis
- 3 - APEC 3090 Econ. of Agricultural Marketing *or*  
3 - MKT 3010 Principles of Marketing
- 3 - ECON (MGT) 3060 Managerial Economics *or*  
3 - ECON 3140 Intermediate Microeconomics
- 3 - ENGL 3140 Technical Writing
- 3 - Minor Requirement<sup>3</sup>

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#### Second Semester

- 3 - APEC 3190 Agribusiness Management
- 3 - APEC 4080 Quantitative Applied Economics
- 3 - APEC 4210 Globalization *or*  
3 - ECON 3100 International Economy
- 3 - ECON 3020 Money and Banking *or*  
3 - ECON 3150 Intermediate Macroeconomics
- 3 - Minor Requirement<sup>3</sup>

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### Senior Year

#### First Semester

- 3 - APEC 4090 Commodity Futures Markets
- 3 - APEC 4120 Regional Economic Dev.
- 3 - APEC 4600 Agricultural Finance
- 3 - LAW 3220 Legal Environment of Business
- 3 - Minor Requirement<sup>3</sup>

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#### Second Semester

- 3 - APEC 4020 Production Economics
- 3 - APEC 4520 Agricultural Policy
- 3 - APEC 4560 Prices
- 3 - Internship, Creative Inquiry or Selected Topics<sup>4</sup>
- 3 - Minor Requirement<sup>3</sup>

15

121 Total Semester Hours

<sup>1</sup>See General Education Requirements.<sup>2</sup>Select from AGED 3550, 4150.<sup>3</sup>See CAFLS approved minors.<sup>4</sup>APEC 4900, 4910, 4940

## AGRICULTURAL EDUCATION

### Bachelor of Science

Agricultural Education provides broad preparation in agricultural sciences and professional education, including communications and human relations skills. In addition to required courses, students may select a minor (see page 63).

The Bachelor's degree prepares students for professional education positions in the mainstream of agriculture, including teaching, cooperative extension service, and government agricultural agencies. The Agricultural Education degree also prepares students for other educational work, such as agricultural missionary, public relations, and training officers in agricultural industry.

In consultation with the departmental advisor, students choose one of the following emphasis areas: Communications, Leadership, or Teaching.

### Freshman Year

#### First Semester

- 1 - AGED 1020 Agric. Ed. Freshman Seminar
- 3 - AGED 3650 Multiculturalism in Agric. Ed.
- 3 - AVS 1500 Introduction to Animal Science
- 1 - AVS 1510 Introduction to Animal Science Lab.
- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 3 - HORT 1010 Horticulture
- 3 - Mathematics Requirement<sup>1</sup>

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#### Second Semester

- 1 - AGED 1000 Orientation and Field Experience
- 3 - AGM 2050 Principles of Fabrication
- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 3 - ENGL 1030 Accelerated Composition
- 6 - Social Science Requirement<sup>2</sup>

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**Sophomore Year****First Semester**

- 3 - AGED 2010 Intro. to Agricultural Education
- 3 - AGED 2040 Applied Agriculture Calculations
- 3 - BT 2200 Biosystems Technology I
- 4 - CH 1010 General Chemistry
- 3 - HORT 2120 Introduction to Turfgrass Culture
- 1 - HORT 2130 Turfgrass Culture Lab.

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**Second Semester**

- 4 - CH 1020 General Chemistry
- 1 - COMM 1010 Communication Academic and Professional Development I<sup>3</sup>
- 3 - EDSP 3700 Introduction to Special Education
- 3 - PHYS 2070 General Physics I
- 3 - STAT 2300 Statistical Methods I
- 3 - Technical Requirement<sup>4</sup>

16-17

<sup>1</sup>MATH 1010, 1020, 1060, 1080, or 2070<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. Note: ANTH 2010, GEOG 1030 or HIST 1730 is recommended to satisfy the Social Science Requirement.<sup>3</sup>Required of students in Communications Emphasis Area only.<sup>4</sup>See advisor.**COMMUNICATIONS EMPHASIS AREA****Junior Year****First Semester**

- 3 - AGED 3030 Mechanical Technology for Agriculture Education
- 3 - AGM 2210 Surveying
- 4 - COMM 2010 Intro. to Communication Studies
- 4 - PES 2020 Soils
- 3 - Arts and Humanities (Non-Lit.) and Science and Technology in Society Requirement<sup>1</sup>

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**Second Semester**

- 3 - EDF 3020 Educational Psychology
- 3 - ENR 3020 Natural Resources Measurements
- 3 - HORT 4040 Plant Propagation
- 1 - HORT 4050 Plant Propagation Techniques Lab.
- 3 - Advanced Writing Requirement<sup>2</sup>
- 3 - Departmental Communication Requirement<sup>3</sup>
- 3 - Oral Communication Requirement<sup>4</sup>

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**Senior Year****First Semester**

- 3 - ENGL 2310 Introduction to Journalism
- 3 - HORT 3030 Landscape Plants
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 6 - Departmental Communication Requirement<sup>3</sup>
- 3 - Technical Requirement<sup>3</sup>

18

**Second Semester**

- 12 - AGED 4070 Internship in Extension and Leadership Education<sup>5</sup>

12

134-135 Total Semester Hours

<sup>1</sup>See General Education Requirements. This course must also satisfy the Science and Technology in Society Requirement.<sup>2</sup>ENGL 3040 or 3140 is recommended.<sup>3</sup>See advisor.<sup>4</sup>See General Education Requirements. COMM 1500 or 2500 is recommended.<sup>5</sup>Internship must meet departmental requirements for Communications Emphasis Area. See advisor.**LEADERSHIP EMPHASIS AREA****Junior Year****First Semester**

- 3 - AGED 3030 Mechanical Technology for Agriculture Education
- 3 - AGM 2210 Surveying
- 3 - HORT 3030 Landscape Plants
- 4 - PES 2020 Soils
- 3 - Advanced Writing Requirement<sup>1</sup>
- 3 - Arts and Humanities (Non-Lit.) and Science and Technology in Society Requirement<sup>1</sup>

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**Second Semester**

- 3 - EDF 3020 Educational Psychology
- 3 - ENR 3020 Natural Resources Measurements
- 3 - HORT 4040 Plant Propagation
- 1 - HORT 4050 Plant Propagation Techniques Lab.
- 3 - Oral Communication Requirement<sup>2</sup>
- 3 - Technical Requirement<sup>4</sup>

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**Senior Year****First Semester**

- 3 - AGED 4030 Principles of Adult/Ext. Educ.
- 3 - AGED 4150 Leadership of Volunteers
- 3 - AGED 4160 Ethics and Issues in Agriculture and the Food and Fiber System
- 3 - MGT 2010 Principles of Management
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Technical Requirement<sup>4</sup>

18

**Second Semester**

- 12 - AGED 4070 Internship in Extension and Leadership Education

12

134-135 Total Semester Hours

<sup>1</sup>ENGL 3040 or 3140 is recommended.<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.<sup>3</sup>See General Education Requirements. COMM 1500 or 2500 is recommended.<sup>4</sup>See advisor.**TEACHING EMPHASIS AREA****Junior Year****First Semester**

- 3 - AGED 3030 Mechanical Technology for Agriculture Education
- 3 - AGM 2210 Surveying
- 3 - HORT 3030 Landscape Plants
- 4 - PES 2020 Soils
- 3 - Advanced Writing Requirement<sup>1</sup>

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**Second Semester**

- 3 - AGED 4160 Ethics and Issues in Agriculture and the Food and Fiber System
- 3 - EDF 3020 Educational Psychology
- 3 - ENR 3020 Natural Resources Measurements
- 3 - HORT 4040 Plant Propagation
- 1 - HORT 4050 Plant Propagation Techniques Lab.
- 3 - Oral Communication Requirement<sup>2</sup>

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**Senior Year****First Semester**

- 1 - AGED 4000 Supervised Field Experience II
- 3 - AGED 4010 Instructional Methods in Ag. Ed.
- 3 - AGED 4030 Principles of Adult/Ext. Education
- 3 - AGED 4230 Curriculum
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Arts and Humanities (Non-Lit.) and Science and Technology in Society Requirement<sup>3</sup>

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**Second Semester**

- 12 - AGED 4060 Directed Teaching
- 2 - AGED 4250 Teaching Agricultural Mechanics

14

130-131 Total Semester Hours

<sup>1</sup>ENGL 3040 or 3140 is recommended.<sup>2</sup>See General Education Requirements. COMM 1500 or 2500 is recommended.<sup>3</sup>See General Education Requirements.**AGRICULTURAL MECHANIZATION AND BUSINESS****Bachelor of Science**

The Agricultural Mechanization and Business major provides a program for students who desire training in areas relevant to dynamic agricultural enterprises. The program is organized with strength in both business management and technical support of agriculture and agribusiness. To produce well rounded individuals with good communication skills, the curriculum includes courses in the humanities, social sciences, English composition, and public speaking.

Graduates in Agricultural Mechanization and Business find meaningful and remunerative employment in a variety of situations directly and indirectly related to agricultural production, processing, marketing, and the many services connected therewith. Farming and technical sales in the agricultural, industrial, and heavy equipment industries are frequently chosen careers.

By completing this curriculum, graduates will have fulfilled the requirements for an Agricultural Business Management minor or other selected minor. Contact the Enrolled Student Services Office to have the minor recorded.

Additional information is available from the departmental offices or can be found at [www.clemson.edu/cafls/safes/agmec/index.html](http://www.clemson.edu/cafls/safes/agmec/index.html).

**Freshman Year****First Semester**

- 1 - AGM 1010 Intro. to Ag. Mech. and Business
- 3 - AGM 2050 Principles of Fabrication
- 3 - APEC 2020 Agricultural Economics or  
3 - ECON 2110 Principles of Microeconomics<sup>1</sup>
- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 3 - MATH 1020 Intro. to Mathematical Analysis

**Second Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking
- 3 - ENGL 1030 Accelerated Composition
- 3 - Elective

**Sophomore Year****First Semester**

- 3 - AGM 2190 Agribusiness and Food Systems
- 3 - AGM 2210 Surveying
- 4 - CH 1010 General Chemistry
- 2 - ENGR 2080 Engineering Graphics and  
Machine Design or  
2 - ENGR 2090 Introduction to Engineering  
Computer Graphics or  
2 - ENGR 2100 Comp. Aided Design/Engr. Apps.
- 4 - PHYS 2000 Introductory Physics or  
3 - PHYS 2070 General Physics I and  
1 - PHYS 2090 General Physics I Lab.

**Second Semester**

- 3 - AGM 2060 Machinery Management
- 3 - AGM 3030 Calculations for Mechanized Agric.
- 4 - CH 1020 General Chemistry
- 3 - Arts and Humanities (Literature) Requirement
- 3 - Plant/Crop Science Requirement<sup>2</sup>

**Junior Year****First Semester**

- 3 - AGM 3010 Soil and Water Conservation
- 3 - AGM 3190 Agribusiness Decision Analysis
- 3 - AGM 4050 Environmental Control in Animal  
Structures
- 3 - APEC 3020 Economics of Farm Management or  
3 - MGT 2010 Principles of Management<sup>1,3</sup>
- 4 - PES 2020 Soils

**Second Semester**

- 3 - AGM 4020 Drainage and Irrigation
- 3 - AGM 4520 Mobile Power
- 3 - STAT 2300 Statistical Methods I<sup>1</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>

**Senior Year****First Semester**

- 1 - AGM 4000 Senior Seminar in Agricultural  
Mechanization and Business
- 3 - AGM 4060 Mechanical and Hydraulic Systems
- 3 - AGM 4600 Electrical Systems
- 3 - APEC 3190 Agribusiness Management or  
3 - MGT 2010 Principles of Management<sup>1,3</sup>
- 3 - MKT 3010 Principles of Marketing<sup>1</sup> or  
3 - APEC 3090 Econ. of Agricultural Marketing
- 3 - Minor Requirement<sup>5</sup>

**Second Semester**

- 3 - AGM 4100 Precision Agriculture Technology
- 3 - AGM 4720 Capstone or  
3 - AGM 4190 Agribusiness Innov./Enprepn.<sup>6</sup>
- 3 - Minor Requirement<sup>5</sup>
- 3 - Plant/Crop<sup>2</sup> or Soil Science<sup>7</sup> Requirement
- 3 - Social Science Requirement<sup>4</sup>

124 Total Semester Hours

<sup>1</sup>Required for students minoring in Business Administration.  
<sup>2</sup>HORT 1010, 2100, 2110, 2120, 4050, (PES) 4330, 4550, 4560,  
PES 1040, 4050, 4210, 4220, 4230, (APEC) 4160, PLPA 3100,  
4060, 4110, or 4590. If applicable, these courses may also be  
used to satisfy minor requirement.

<sup>3</sup>MGT 2010 can count for either of the APEC 3020 or 3190  
requirement but not for both.

<sup>4</sup>See General Education Requirements. Three of these credit hours  
must also satisfy the Cross-Cultural Awareness and three must  
satisfy the Science and Technology in Society Requirements.

<sup>5</sup>See CAFLS approved minors. If requirements for an approved  
minor have already been satisfied, this course may be any  
3000-level (or higher) course from an approved program. Any  
required course in the curriculum can also be used to count  
towards minor requirements.

<sup>6</sup>AGM 4190 is a fall-only course. Students electing to take AGM  
4190 must switch the course order with a fall listing.

<sup>7</sup>PES 4030, 4460, 4520, 4850, or 4900. If applicable, these  
courses may also be used to satisfy minor requirement.

**ANIMAL AND VETERINARY  
SCIENCES****Bachelor of Science**

The Animal and Veterinary Sciences curriculum provides students with both a basic and applied understanding of the scientific principles needed for successful careers in the scientific, technical, and business phases of livestock and poultry production, processing, and marketing. Strengths of this program include extensive hands-on instruction at Clemson's five animal farms, personalized advising, and the opportunity for valued-added experiences, including involvement in research, teaching, extension, international travel, and internships. Students choose from three concentrations.

The Animal Agribusiness Concentration prepares students for careers in the many facets of the animal industries, including production, sales and marketing, business management, advertising, and extension. The Equine Business Concentration prepares students for such professions as trainers, managers, riding instructors, sales or media representatives, breed association representatives or for equine entrepreneurial careers such as owners of tack shops, boarding facilities, or riding schools. The Pre-veterinary and Science Concentration prepares students to meet the requirements for most veterinary schools,

graduate schools, and medical and dental schools. Students with South Carolina residency may compete for contract seats at Mississippi State, Tuskegee, and University of Georgia Colleges of Veterinary Medicine. Experienced preprofessional advising is provided for all students pursuing advanced degrees.

**Change of Major into Animal and  
Veterinary Sciences**

Students who change majors into Animal and Veterinary Sciences must have a 2.5 minimum cumulative grade-point average.

**ANIMAL AGRIBUSINESS  
CONCENTRATION****Freshman Year****First Semester**

- 1 - AVS 1000 Orientation to Animal and Vet. Sci.
- 3 - AVS 1500 Introduction to Animal Science
- 1 - AVS 1510 Introduction to Animal Science Lab.
- 3 - BIOL 1030 General Biology I and  
1 - BIOL 1050 General Biology Lab. I or  
5 - BIOL 1100 Principles of Biology I
- 4 - CH 1010 General Chemistry
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>

**Second Semester**

- 3 - BIOL 1040 General Biology II and  
1 - BIOL 1060 General Biology Lab. II or  
5 - BIOL 1110 Principles of Biology II
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - MATH 1010 Essen. Math. for Informed Soc. or  
3 - MATH 1020 Intro. to Math. Analysis or  
4 - MATH 1060 Calculus of One Variable I
- 2 - AVS Techniques Requirement<sup>2</sup>

**Sophomore Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
- 3 - MGT 2010 Principles of Management
- 3 - STAT 2300 Statistical Methods I
- 2 - AVS Techniques Requirement<sup>2</sup>
- 3 - Elective

**Second Semester**

- 3 - ECON 2110 Principles of Microeconomics
- 3 - FIN 3060 Corporation Finance
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 2 - AVS Evaluation Requirement<sup>3</sup>
- 2 - AVS Techniques Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>1</sup>

**Junior Year****First Semester**

- 4 - AVS 3010 Anat. and Phys. of Domestic Animals
- 3 - AVS 3700 Principles of Animal Nutrition
- 3 - AVS 4700 Animal Genetics
- 3 - ECON 2120 Principles of Macroeconomics
- 3 - PES 4230 Field Crops-Forages

**Second Semester**

- 3 - AVS 3750 Applied Animal Nutrition
  - 3 - AVS 4130 Animal Products
  - 3 - AVS 4530 Animal Reproduction
  - 3 - LAW 3220 Legal Environment of Business
  - 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - AVS 3100 Animal Health
  - 1 - AVS 4000 Animal and Veterinary Sciences Professional Development
  - 3 - AVS 4150 Contemporary Issues in Animal Sci.
  - 3 - MKT 3010 Principles of Marketing
  - 2 - AVS Experience-Based Activity<sup>4</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 14

**Second Semester**

- 2 - AVS 4060 Seminars and Related Topics
  - 3 - AVS 4100 Domestic Animal Behavior
  - 2 - AVS 4170 Animal Agribusiness Development
  - 3 - AVS Experience-Based Activity<sup>4</sup>
  - 4 - Production Class<sup>5</sup>
  - 2 - Elective
- 16

123–126 Total Semester Hours

<sup>1</sup>See General Education Requirements. Social Science courses must be selected from two different fields. APEC and ECON are considered the same field. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2110, 3020, 3090, 3110, 3230, 4050 or 4550

<sup>3</sup>Select from AVS 3020, 3090, 3110 or 3230

<sup>4</sup>Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910

<sup>5</sup>Select from AVS 4500, 4010 or 4120

**EQUINE BUSINESS CONCENTRATION****Freshman Year****First Semester**

- 1 - AVS 1000 Orientation to Animal and Vet. Sci.
  - 3 - AVS 1500 Introduction to Animal Science
  - 1 - AVS 1510 Introduction to Animal Science Lab.
  - 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 16-17

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1010 Essen. Math. for Informed Soc. *or*
  - 3 - MATH 1020 Intro. to Math. Analysis *or*
  - 4 - MATH 1060 Calculus of One Variable I
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 16-18

**Sophomore Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
  - 2 - AVS 2040 Horse Care Techniques
  - 3 - MGT 2010 Principles of Management
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Elective
- 14

**Second Semester**

- 2 - AVS 3090 Principles of Equine Evaluation
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - FIN 3060 Corporation Finance
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 16

**Junior Year****First Semester**

- 4 - AVS 3010 Anat. and Phys. of Domestic Animals
  - 3 - AVS 3700 Principles of Animal Nutrition
  - 3 - AVS 4700 Animal Genetics
  - 3 - ECON 2120 Principles of Macroeconomics
  - 3 - PES 4230 Field Crops—Forages
- 16

**Second Semester**

- 3 - AVS 3750 Applied Animal Nutrition
  - 3 - AVS 4530 Animal Reproduction
  - 3 - LAW 3220 Legal Environment of Business
  - 3 - MKT 3010 Principles of Marketing
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 14

**Senior Year****First Semester**

- 3 - AVS 3100 Animal Health
  - 1 - AVS 4000 Animal and Veterinary Sciences Professional Development
  - 2 - AVS 4060 Seminars and Related Topics
  - 3 - AVS 4150 Contemporary Issues in Animal Sci.
  - 4 - AVS 4160 Equine Exercise Physiology
  - 2 - AVS Experience-Based Activity<sup>3</sup>
- 15

**Second Semester**

- 3 - AVS 4100 Domestic Animal Behavior
  - 4 - AVS 4120 Advanced Equine Management
  - 2 - AVS 4170 Animal Agribusiness Development
  - 5 - Elective
- 14

121–124 Total Semester Hours

<sup>1</sup>See General Education Requirements. APEC and ECON courses may not be used to fulfill the Social Science Requirement. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>Select from AVS 2000, 2010, 2030, 2050, 2060, 2090, 2110, 3020, 3090, 3110, 3230, 4050 or 4550

<sup>3</sup>Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910

**PREVETERINARY AND SCIENCE CONCENTRATION****Freshman Year****First Semester**

- 1 - AVS 1000 Orientation to Animal and Vet. Sci.
  - 3 - AVS 1500 Introduction to Animal Science
  - 1 - AVS 1510 Intro. to Animal Science Lab.
  - 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 16-17

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1020 Intro. to Math. Analysis *or*
  - 4 - MATH 1060 Calculus of One Variable I
  - 2 - AVS Techniques Requirement<sup>2</sup>
- 16-18

**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - PHYS 2070 General Physics I
  - 1 - PHYS 2090 General Physics I Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 16

**Second Semester**

- 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - PHYS 2080 General Physics II
  - 1 - PHYS 2100 General Physics II Lab.
  - 3 - STAT 2300 Statistical Methods I
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Oral Communication Requirement<sup>3</sup>
- 16

**Junior Year****First Semester**

- 4 - AVS 3010 Anat. and Phys. of Domestic Animals
  - 3 - AVS 3100 Animal Health
  - 3 - AVS 3700 Principles of Animal Nutrition
  - 3 - BCHM 3010 Molecular Biochemistry *or*
  - 3 - BCHM 3050 Essential Elements of Bioch. *or*
  - 3 - BCHM 4060 Physiological Chemistry
  - 3 - Departmental Requirement<sup>4</sup>
- 16

**Second Semester**

- 3 - AVS 3750 Applied Animal Nutrition
  - 3 - AVS 4530 Animal Reproduction
  - 3 - GEN 3000 Fundamental Genetics<sup>5</sup>
  - 4 - MICR 3050 General Microbiology<sup>5</sup>
  - 1 - AVS Experience-Based Activity<sup>6</sup>
- 14

**Senior Year****First Semester**

- 1 - AVS 4000 Animal and Veterinary Sciences Professional Development
  - 2 - AVS 4060 Seminars and Related Topics
  - 3 - AVS 4150 Contemporary Issues in Animal Sci.
  - 2 - AVS Techniques Requirement<sup>2</sup>
  - 3 - Departmental Requirement<sup>4</sup>
  - 3 - Elective
- 14

**Second Semester**

- 3 - AVS 4100 Domestic Animal Behavior
- 3 - AVS 4130 Animal Products
- 2 - AVS Experience-Based Activity<sup>6</sup>
- 3 - Departmental Requirement<sup>4</sup>
- 3 - Social Science Requirement<sup>1</sup>

14

122-125 Total Semester Hours

<sup>1</sup>See General Education Requirements. Social Science courses must be selected from two different fields. APEC and ECON are considered the same field. Three of these General Education credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>Select from AVS 2000, 2010, 2030, 2040, 2050, 2060, 2090, 2110, 3020, 3090, 3110, 3230, 4050 or 4550.

<sup>3</sup>COMM 1500 or 2500

<sup>4</sup>Select nine hours from any graded (not Pass/No Pass) 3000- or 4000-level course and/or any of the following: ACCT 2010, APEC 2020 or ECON 2110, BIOL 2220, 2230, ECON 2120, MGT 2010, PES 2020, SPAN 1010, 1020.

<sup>5</sup>May take GEN 3000 and MICR 3050 in either semester of the junior year.

<sup>6</sup>Select from AVS 3600, 3900, 4410, 4420, 4430, 4440 or 4910.

**BIOCHEMISTRY****Bachelor of Science**

Biochemistry is the study of the molecular basis of life. To comprehend current biochemical information and make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation in chemistry, mathematics, and physics. This is the basis of the biochemistry curriculum.

The program provides an excellent educational background for professional school (medicine, dentistry, or veterinary medicine) and graduate school in biochemistry, molecular biology, or another biological science discipline. Graduates will find employment opportunities in the research and service programs of universities, medical schools, hospitals, research institutes, and industrial and government laboratories.

**Freshman Year****First Semester**

- 1 - BCHM 1030 Careers in Biochem. and Genetics
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 4 - MATH 1060 Calculus of One Variable I
- 14

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1080 Calculus of One Variable II
- 16

**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - GEN 3020 Molecular and General Genetics
  - 2 - GEN 3030 Molecular and Gen. Genetics Lab.
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab. I
  - 3-4 - Advanced Mathematics Requirement<sup>1</sup>
- 16-17

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - COMM 1500 Intro. to Human Comm. or 3 - COMM 2500 Public Speaking
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Lab. II
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 17

**Junior Year****First Semester**

- 3 - BCHM 4310 Physical Approach to Biochem.
  - 2 - BCHM 4330 General Biochemistry Lab. I
  - 3 - CH 3300 Introduction to Physical Chemistry<sup>3</sup>
  - 3 - Science Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>5</sup>
  - 2 - Elective<sup>6</sup>
- 16

**Second Semester**

- 3 - BCHM 4320 Biochemistry of Metabolism
- 2 - BCHM 4340 General Biochemistry Lab. II
- 3 - BCHM 4360 Molecular Biol.: Genes to Proteins
- 3 - PHIL 3260 Science and Values
- 3 - Social Science Requirement<sup>5</sup>

14

**Senior Year****First Semester**

- 3 - BIOL 4610 Cell Biology
  - 3 - GEN (BCHM) 4400 Bioinformatics
  - 3 - Science Requirement<sup>4</sup>
  - 4 - Elective<sup>6</sup>
- 13

**Second Semester**

- 2 - BCHM 4930 Senior Seminar
- 3 - Science Requirement<sup>4</sup>
- 9 - Elective<sup>6</sup>

14

120-121 Total Semester Hours

<sup>1</sup>STAT 2300 or MATH 2060

<sup>2</sup>See General Education Requirements.

<sup>3</sup>CH 3310 may be substituted.

<sup>4</sup>BIOL 2220, 2230, or any courses at 3000 level or above in BCHM, BIOE, BIOL, CH, GEN, MATH, MICR, PHYS, PLPA, and STAT. Other courses must be approved by advisor.

<sup>5</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>6</sup>Two semesters of a foreign language are strongly recommended.

Notes:

1. A student is allowed to enroll in science and mathematics courses only when all prerequisites have been passed with a grade of C or higher.
2. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

**BIOLOGICAL SCIENCES****Bachelor of Science**

Biology encompasses the broad spectrum of the modern life sciences, including the study of all aspects of life from the structure and function of the whole organism down to the subcellular levels and up through the interactions of organisms to the integrated existence of life on the entire planet. Descriptive, structural, functional, and evolutionary questions are explored through the hierarchy of the organization of life. Applications of current advances to the health and well-being of man and society, to nature and the continuation of earth as a balanced ecosystem, and to an appreciation of the place of natural science in our cultural heritage receive emphasis.

Majors in Biological Sciences receive classroom, laboratory, and field training in biology with an emphasis on chemistry, mathematics, and physics as necessary tools. The Bachelor of Science in Biological Sciences curriculum prepares students for graduate study in any of the life science areas (such as agricultural sciences, biochemistry, botany, cell and molecular biology, conservation, ecology and environmental science, entomology, forestry, genetics, industrial and regulatory biology, microbiology, morphology, physiology, wildlife biology, and zoology; for the health professions (medicine, dentistry, etc.), veterinary medicine; and for science teaching.

**Combined Bachelor of Science in Biological Sciences/Master of Science in Bioengineering**

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. See Academic Regulations in this catalog for enrollment guidelines and procedures. Students are encouraged to obtain the specific requirements for the dual degree from the Department of Biological Sciences or Bioengineering as early as possible in their undergraduate program as a number of required courses have prerequisites not normally taken by Biological Sciences majors.

**Freshman Year****First Semester**

- 1 - BIOL 1010 Frontiers in Biology I or 1 - MICR 1010 Microbes and Human Affairs
  - 5 - BIOL 1100 Principles of Biology I<sup>1</sup>
  - 4 - CH 1010 General Chemistry
  - 3 - COMM 1500 Intro. to Human Comm. or 3 - COMM 2500 Public Speaking
  - 4 - MATH 1060 Calculus of One Variable I
- 17

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II<sup>1</sup>
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3-4 - Mathematical Sciences Requirement<sup>2</sup>
- 15-16

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry and  
1 - CH 2020 Survey of Organic Chemistry Lab. or  
3 - CH 2230 Organic Chemistry and  
1 - CH 2270 Organic Chemistry Lab.  
3 - GEN 3000 Fundamental Genetics<sup>3</sup>  
3 - Arts and Humanities (Literature) Requirement<sup>4</sup>  
4 - Organismal Diversity Requirement<sup>5</sup>  
2 - Elective  
16

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or  
3 - BCHM 3050 Essential Elements of Bioch.<sup>3</sup>  
3 - BIOL 3350 Evolutionary Biology or  
3 - Elective  
4 - Major Requirement<sup>6,7</sup>  
3 - Social Science Requirement<sup>4</sup>  
3 - Elective  
16

**Junior Year****First Semester**

- 3 - BIOL 3350 Evolutionary Biology or  
3 - Elective  
3 - BIOL 4610 Cell Biology  
2 - BIOL 4620 Cell Biology Lab.  
3 - PHYS 1220 Physics with Calculus I and  
1 - PHYS 1240 Physics Lab. I or  
3 - PHYS 2070 General Physics I and  
1 - PHYS 2090 General Physics I Lab.  
3 - Ecology Requirement<sup>8</sup>  
15

**Second Semester**

- 3 - ENGL 3150 Scientific Writing and Comm.  
3 - PHYS 2080 General Physics II and  
1 - PHYS 2100 General Physics II Lab. or  
3 - PHYS 2210 Physics with Calculus II and  
1 - PHYS 2230 Physics Lab. II  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>5</sup>  
3 - Functional Biology Requirement<sup>9</sup>  
2 - Major Requirement<sup>7</sup>  
15

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or  
2 - MICR 4930 Senior Seminar  
6 - Major Requirement<sup>7</sup>  
3 - Social Science Requirement<sup>4</sup>  
4 - Elective  
15

**Second Semester**

- 9 - Major Requirement<sup>7</sup>  
3 - Elective  
12

121-122 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.

<sup>2</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>Or other approved coursework at the 2000 level or higher.

<sup>4</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>5</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>6</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>7</sup>Twenty-one credit hours. At least seventeen credit hours must come from BIOL or MICR courses at the 3000-level or higher, four credit hours of which must be laboratory. Up to four credit hours may come from CH 2240/2280 or courses on the department-approved list. Any combination of BIOL 4910, 4920, 4940 and 4950 may not exceed eight credit hours.

<sup>8</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>9</sup>At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

**ENTOMOLOGY EMPHASIS AREA**

See Bachelor of Science curriculum for freshman year requirements.

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry and  
1 - CH 2020 Survey of Organic Chemistry Lab. or  
3 - CH 2230 Organic Chemistry and  
1 - CH 2270 Organic Chemistry Lab.  
4 - ENT (BIOL) 3010 Insect Biology and Diversity  
3 - GEN 3000 Fundamental Genetics<sup>3</sup>  
3 - Arts and Humanities (Literature) Requirement<sup>4</sup>  
2 - Elective  
16

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or  
3 - BCHM 3050 Essential Elements of Bioch.<sup>3</sup>  
3 - BIOL 3350 Evolutionary Biology  
4 - Major Requirement<sup>6</sup>  
3 - Social Science Requirement<sup>4</sup>  
3 - Elective  
16

**Junior Year****First Semester**

- 3 - BIOL 4610 Cell Biology  
2 - BIOL 4620 Cell Biology Laboratory  
3 - PHYS 1220 Physics with Calculus I and  
1 - PHYS 1240 Physics Lab. I or  
3 - PHYS 2070 General Physics I and  
1 - PHYS 2090 General Physics I Lab.  
3 - Ecology Requirement<sup>7</sup>  
3 - Entomology Requirement<sup>8</sup>  
15

**Second Semester**

- 3 - ENGL 3150 Scientific Writing and Comm.  
3 - PHYS 2080 General Physics II and  
1 - PHYS 2100 General Physics II Lab. or  
3 - PHYS 2210 Physics with Calculus II and  
1 - PHYS 2230 Physics Lab. II  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>5</sup>  
3 - Entomology Requirement<sup>8</sup>  
3 - Functional Biology Requirement<sup>9</sup>  
16

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or  
2 - MICR 4930 Senior Seminar  
4 - Entomology Requirement<sup>9</sup>  
3 - Social Science Requirement<sup>5</sup>  
4 - Elective  
13

**Second Semester**

- 4 - Entomology Requirement<sup>9</sup>  
3 - Major Requirement<sup>6</sup>  
6 - Elective  
13

121-122 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.

<sup>2</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>Or other approved coursework at the 2000 level or higher.

<sup>4</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>5</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>6</sup>Seven credit hours must be selected from BIOL or MICR courses at the 3000-level or above or CH 2240/2280.

<sup>7</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>8</sup>ENT (BIOL) 4000, (BIOL) 4150 and seven additional credits selected from ENT 3000, 3080, 4040/4090, 4070 (BIOL) 4360, (BIOL, WFB) 4690, 4900 (GEN) 4950, or PLPA (ENT) 4060.

<sup>9</sup>At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

**PREPHARMACY EMPHASIS AREA****Freshman Year****First Semester**

- 1 - BIOL 1010 Frontiers in Biology I or  
1 - MICR 1010 Microbes and Human Affairs  
3 - BIOL 1030 General Biology I<sup>1</sup>  
1 - BIOL 1050 General Biology Lab. I<sup>1</sup>  
4 - CH 1010 General Chemistry  
3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking  
4 - MATH 1060 Calculus of One Variable I  
16

**Second Semester**

- 3 - BIOL 1040 General Biology II<sup>1</sup>  
1 - BIOL 1060 General Biology Lab. II<sup>1</sup>  
4 - CH 1020 General Chemistry  
3 - ENGL 1030 Accelerated Composition  
3 - Mathematical Sciences Requirement<sup>2</sup>  
14-15

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry and  
1 - CH 2020 Survey of Organic Chemistry Lab. or  
3 - CH 2230 Organic Chemistry and  
1 - CH 2270 Organic Chemistry Lab.  
3 - GEN 3000 Fundamental Genetics<sup>3</sup>  
3 - Arts and Humanities (Literature) Requirement<sup>4</sup>  
3 - Organismal Diversity Requirement<sup>5</sup>  
2 - Elective  
16



**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or
- 3 - BCHM 3050 Essential Elements of Bioch.<sup>3</sup>
- 3 - BIOL 3350 Evolutionary Biology
- 3 - CH 2240 Organic Chemistry and
- 1 - CH 2280 Organic Chemistry Lab.
- 3 - Social Science Requirement<sup>4</sup>
- 3 - Elective
- 16

**Junior Year****First Semester**

- 4 - BIOL 3150 Functional Human Anatomy
- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - PHYS 1220 Physics with Calculus I and
- 1 - PHYS 1240 Physics Lab. I or
- 3 - PHYS 2070 General Physics I and
- 1 - PHYS 2090 General Physics I Lab.
- 3 - PSYC 2010 Introduction to Psychology
- 16

**Second Semester**

- 4 - BIOL 3160 Human Physiology
- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - PHYS 2080 General Physics II and
- 1 - PHYS 2100 General Physics II Lab. or
- 3 - PHYS 2210 Physics with Calculus II and
- 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>4</sup>
- 3 - Economics Requirement<sup>6</sup>
- 17

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or
- 2 - MICR 4930 Senior Seminar
- 3 - Ecology Requirement<sup>7</sup>
- 3 - Major Requirement<sup>8</sup>
- 5 - Elective
- 13

**Second Semester**

- 4 - MICR 3050 General Microbiology
- 3 - Major Requirement<sup>8</sup>
- 6 - Elective
- 13

121-122 Total Semester Hours

<sup>1</sup>Pharmacy programs require BIOL 1030/1050 and 1040/1060 or equivalent; however, BIOL 1100 and 1110 may substitute. The additional 1-2 credit hours will be subtracted from Major Requirement credits.

<sup>2</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>Or other approved coursework at the 2000 level or higher.

<sup>4</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>5</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>6</sup>ECON 2000, 2110, or 2120

<sup>7</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>8</sup>Six credit hours must be selected from BIOL or MICR courses at the 3000 level or above or from the department-approved list.

**QUANTITATIVE BIOLOGY EMPHASIS AREA**

See Bachelor of Science curriculum for freshman year requirements.

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry and
- 1 - CH 2020 Survey of Organic Chemistry Lab. or
- 3 - CH 2230 Organic Chemistry and
- 1 - CH 2270 Organic Chemistry Lab.
- 4 - Organismal Diversity Requirement<sup>3</sup>
- 3 - Partial Differential Equations Requirement<sup>4</sup>
- 2 - Elective
- 16

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or
- 3 - BCHM 3050 Essential Elements of Bioch.<sup>5</sup>
- 3 - STAT 2300 Statistical Methods I
- 4 - Major Requirement<sup>6,7</sup>
- 3 - Social Science Requirement<sup>8</sup>
- 3 - Elective
- 16

**Junior Year****First Semester**

- 3 - BIOL 3350 Evolutionary Biology
- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Lab.
- 3 - PHYS 1220 Physics with Calculus I and
- 1 - PHYS 1240 Physics Lab. I or
- 3 - PHYS 2070 General Physics I and
- 1 - PHYS 2090 General Physics I Lab.
- 3 - STAT 3300 Statistical Methods II
- 15

**Second Semester**

- 4 - BIOL 4280 Quantitative Biology
- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - PHYS 2080 General Physics II and
- 1 - PHYS 2100 General Physics II Lab. or
- 3 - PHYS 2210 Physics with Calculus II and
- 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement<sup>8</sup>
- 3 - Ecology Requirement<sup>9</sup>
- 17

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or
- 2 - MICR 4930 Senior Seminar
- 3 - GEN 4400 Bioinformatics
- 3 - Functional Biology Requirement<sup>10</sup>
- 3 - Social Science Requirement<sup>8</sup>
- 2 - Elective
- 13

**Second Semester**

- 1 - BIOL 4910 Undergraduate Research
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>8</sup>
- 8 - Elective
- 12

122 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credit hours required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.

<sup>2</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>4</sup>See advisor.

<sup>5</sup>Or other approved coursework at the 2000 level or higher.

<sup>6</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>7</sup>Four credit hours must be selected from BIOL or MICR courses at the 3000 level or above, or CH 2240/2280, or from the department-approved list.

<sup>8</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>9</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>10</sup>At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

**TOXICOLOGY EMPHASIS AREA**

See Bachelor of Science curriculum for freshman year requirements.

**Sophomore Year****First Semester**

- 3 - BIOL 2100 Introduction to Toxicology
- 3 - CH 2010 Survey of Organic Chemistry and
- 1 - CH 2020 Survey of Organic Chemistry Lab. or
- 3 - CH 2230 Organic Chemistry and
- 1 - CH 2270 Organic Chemistry Lab.
- 3 - GEN 3000 Fundamental Genetics<sup>3</sup>
- 4 - Organismal Diversity Requirement<sup>4</sup>
- 2 - Elective
- 16

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or
- 3 - BCHM 3050 Essential Elements of Bioch.<sup>3</sup>
- 3 - BIOL 3350 Evolutionary Biology
- 4 - Major Requirement<sup>5,6</sup>
- 3 - Social Science Requirement<sup>7</sup>
- 3 - Elective
- 16

**Junior Year****First Semester**

- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - ETOX 4300 Toxicology
- 3 - PHYS 1220 Physics with Calculus I and
- 1 - PHYS 1240 Physics Lab. I or
- 3 - PHYS 2070 General Physics I and
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Ecology Requirement<sup>8</sup>
- 15

**Second Semester**

- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - PHYS 2080 General Physics II and
- 1 - PHYS 2100 General Physics II Lab. or
  - 3 - PHYS 2210 Physics with Calculus II and
  - 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement<sup>7</sup>
- 3 - Functional Biology Requirement<sup>9</sup>
- 2 - Elective

15

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or
  - 2 - MICR 4930 Senior Seminar
- 3 - CH 3130 Quantitative Analysis
- 2 - CH 3170 Quantitative Analysis Lab.
- 3 - Social Science Requirement<sup>7</sup>
- 5 - Elective

15

**Second Semester**

- 3 - CH 4130 Chemistry of Aqueous Systems or
  - 3 - ETOX 4210 Chemical Sources and Fate in Environmental Systems
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>7</sup>
- 3 - Toxicology Requirement<sup>10</sup>
- 3 - Elective

12

121-122 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.

<sup>2</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>Or other approved coursework at the 2000 level or higher.

<sup>4</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>5</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>6</sup>Four credit hours must be selected from BIOL or MICR courses at the 3000 level or above or CH 2240/2280, or from the department-approved list.

<sup>7</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>8</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>9</sup>At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

<sup>10</sup>Any 4000-level ETOX course.

**BIOLOGICAL SCIENCES****Bachelor of Arts**

The Bachelor of Arts in Biological Sciences provides a strong foundation in biology and is ideal for students desiring a liberal education emphasizing an interdisciplinary approach to a thorough understanding of the life sciences.

**Double Major in Biological Sciences/ Science Teaching—Biological Sciences**

The Bachelor of Arts Degree in Biological Sciences and Science Teaching—Biological Sciences prepares students for teaching biology on the secondary school level and for graduate studies in any of the life science areas. See page 116 for the curriculum.

**Freshman Year****First Semester**

- 1 - BIOL 1010 Frontiers in Biology I<sup>1</sup> or
  - 1 - MICR 1010 Microbes and Human Affairs<sup>1</sup>
- 5 - BIOL 1100 Principles of Biology I<sup>2</sup>
- 4 - CH 1010 General Chemistry
- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
- 4 - MATH 1060 Calculus of One Variable I

17

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II<sup>2</sup>
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3-4 - Mathematical Sciences Requirement<sup>3</sup>

15-16

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry and
- 1 - CH 2020 Survey of Organic Chemistry Lab. or
  - 3 - CH 2230 Organic Chemistry and
  - 1 - CH 2270 Organic Chemistry Lab.
- 3 - GEN 3000 Fundamental Genetics<sup>4</sup>
- 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>
- 4 - Foreign Language Requirement<sup>6</sup>
- 3 - Social Science Requirement<sup>5</sup>

17

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or
  - 3 - BCHM 3050 Essential Elements of Bioch.<sup>4</sup>
- 4 - Foreign Language Requirement<sup>6</sup>
- 4 - Major Requirement<sup>7,8</sup>
- 4 - Organismal Diversity Requirement<sup>9</sup>

15

**Junior Year****First Semester**

- 3 - BIOL 3350 Evolutionary Biology
- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory<sup>10</sup>
- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - Foreign Language Requirement<sup>6</sup>
- 3 - Minor Requirement<sup>11</sup>

17

**Second Semester**

- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>5</sup>
- 3 - Foreign Language Requirement<sup>6</sup>
- 3 - Ecology Requirement<sup>12</sup>
- 6 - Minor Requirement<sup>11</sup>

15

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar<sup>13</sup> or
  - 2 - MICR 4930 Senior Seminar<sup>13</sup>
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Functional Biology Requirement<sup>14</sup>
- 3 - Social Science Requirement<sup>5</sup>

12

**Second Semester**

- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 6 - Minor Requirement<sup>11</sup>
- 3 - Elective

13

121-122 Total Semester Hours

<sup>15</sup>Students seeking a double major in Science Teaching and Biological Sciences should substitute ED 1050 for BIOL 1010 or MICR 1010.

<sup>2</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 2000 level or higher.

<sup>3</sup>MATH 1110, STAT 2300, or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.

<sup>4</sup>Or other approved coursework at the 2000 level or higher.

<sup>5</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>6</sup>Four semesters (through 2020) in the same modern foreign language are required.

<sup>7</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory.

<sup>8</sup>Four credit hours must be selected from BIOL or MICR courses at the 3000 level or above or CH 2240/2280, or from the department-approved list. Students seeking a double major in Science Teaching/Biological Sciences should substitute EDSC 4470 for Major Requirement.

<sup>9</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>10</sup>Students seeking a double major in Science Teaching and Biological Sciences should substitute BIOL (EDSC) 4820 for BIOL 4620.

<sup>11</sup>See page 63 for approved minors.

<sup>12</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>13</sup>Students seeking a double major in Science Teaching/Biological Sciences should substitute EDSC 4570 for BIOL 4930 or MICR 4930.

<sup>14</sup>At least one course selected from BIOL 3160, 4010, 4080, 4590, 4750, or 4800.

**PREREHABILITATION SCIENCES EMPHASIS AREA****Freshman Year****First Semester**

- 1 - BIOL 1010 Frontiers in Biology I or
  - 1 - MICR 1010 Microbes and Human Affairs
- 3 - BIOL 1030 General Biology I<sup>1</sup> and
- 1 - BIOL 1050 General Biology Lab. I<sup>1</sup>
- 4 - CH 1010 General Chemistry
- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
- 4 - MATH 1060 Calculus of One Variable I

16

**Second Semester**

- 3 - BIOL 1040 General Biology II<sup>1</sup> and
- 1 - BIOL 1060 General Biology Lab. II<sup>1</sup>
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - Statistics Requirement<sup>2</sup>

14

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry<sup>3</sup>
- 1 - CH 2020 Survey of Organic Chemistry Lab.<sup>3</sup>
- 3 - GEN 3000 Fundamental Genetics<sup>4</sup>
- 4 - Foreign Language Requirement<sup>5</sup>
- 4 - Organismal Diversity Requirement<sup>6</sup>

15

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry or
- 3 - BCHM 3050 Essential Elements of Bioch.<sup>4</sup>
- 3 - PSYC 2010 Introduction to Psychology
- 3 - Arts and Humanities (Literature) Requirement<sup>7</sup>
- 4 - Foreign Language Requirement<sup>5</sup>
- 3 - Social Science Requirement<sup>7</sup>

16

**Junior Year****First Semester**

- 4 - BIOL 3150 Functional Human Anatomy
- 3 - BIOL 3350 Evolutionary Biology
- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - Foreign Language Requirement<sup>5</sup>

15

**Second Semester**

- 4 - BIOL 3160 Human Physiology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>7</sup>
- 3 - Foreign Language Requirement<sup>5</sup>
- 6 - Minor Requirement<sup>8</sup>

16

**Senior Year****First Semester**

- 2 - BIOL 4930 Senior Seminar or
- 2 - MICR 4930 Senior Seminar
- 3 - ENGL 3150 Scientific Writing and Comm.
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Ecology Requirement<sup>9</sup>
- 3 - Minor Requirement<sup>8</sup>

15

**Second Semester**

- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 6 - Minor Requirement<sup>8</sup>
- 3 - Prerehabilitation Requirement<sup>10</sup>
- 2 - Elective

15

122 Total Semester Hours

<sup>1</sup>Rehabilitation programs require BIOL 1030/1050 and 1040/1060 or equivalent; however, BIOL 1100 and 1110 may substitute.

<sup>2</sup>STAT 2300 or other approved coursework. See advisor. Medical/dental schools have different mathematics requirements.

<sup>3</sup>Most professional health sciences schools require two semesters of organic chemistry with laboratory, CH 2230/2270 and 2240/2280.

<sup>4</sup>Or other approved coursework at the 2000 level or higher.

<sup>5</sup>Four semesters (through 2020) in the same modern foreign language are required.

<sup>6</sup>At least one lecture and associated laboratory selected from BIOL 3010, 3020/3060, 3030/3070, 3040/3080, 3200, 4060/4070, 4250/4260 or other approved coursework at the 2000 level or higher.

<sup>7</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>8</sup>See page 63 in the *Undergraduate Announcements* for approved minors. Psychology is recommended. The Medical University of South Carolina and other Rehabilitation Sciences programs require PSYC 2010 and 3830.

<sup>9</sup>At least one course selected from BIOL 4410, 4420, 4430, 4460, 4700, or MICR 4010.

<sup>10</sup>BIOL 4780 or 4790 or MICR 3050. BIOL 4780 or 4790 is recommended for physical and occupational therapy programs. MICR 3050 is recommended for physician assistant programs.

**ENVIRONMENTAL AND NATURAL RESOURCES****Bachelor of Science**

The Environmental and Natural Resources curriculum produces professionals who have a broad-based knowledge in natural resources and an ability to interact with other resource professionals to provide thoughtful solutions to environmental and natural resource problems. The world is blessed with an abundance of natural resources, but the problems associated with their conservation are immense. Protection of rare and endangered species, preventing and controlling invasions of exotics, protecting old growth forests, restoring degraded ecosystems, and balancing the resource demands of industry and the public are some of the environmental issues which are enmeshed in politicized environments.

Three concentrations are offered within the Environmental and Natural Resources major, which is administered by the School of Agricultural, Forest, and Environmental Sciences. The Conservation Biology Concentration is oriented toward students who desire a greater exposure to taxa, their habitats, and their interrelationships. The Natural Resources Management Concentration emphasizes both resource management and negotiation skills. The Natural Resource and Economic Policy Concentration provides more in-depth study in economics and policy applications.

Graduates in Environmental and Natural Resources are well prepared for further graduate studies in natural resources and related fields. Potential public sector employers of graduates include federal, state, and municipal resource management agencies, private industries impacting land and water resources, environmental management consulting firms, and various environmental advocacy groups.

**Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 4 - CH 1010 or 1050 (Chemistry Requirement)<sup>1</sup>
- 1 - ENR 1010 Intro. to Env. and Natural Res. I
- 3 - MATH 1020 Intro. to Mathematical Analysis
- 3 - Oral Communications Requirement<sup>2</sup>

15

**Second Semester**

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 4 - CH 1020 or 1060 (Chemistry Requirement)<sup>1</sup>
- 3 - ENGL 1030 Accelerated Composition
- 1 - FNR 1020 FNR Freshman Portfolio
- 3 - STAT 2300 Statistical Methods I

15

<sup>1</sup>See advisor. Conservation Biology Concentration students or students planning to take organic chemistry must take CH 1010 and CH 1020 and must satisfy the General Education Science and Technology in Society Requirement through another course.

<sup>2</sup>See General Education Requirements.

**CONSERVATION BIOLOGY CONCENTRATION****Sophomore Year****First Semester**

- 3 - APEC 2570 Natural Resources, Environment, and Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 4 - BIOL 3200 Field Botany and
- 1 - Elective or
- 2 - FOR 2050 Dendrology and
- 3 - FOR 2210 Forest Biology
- 3 - CH 2230 Organic Chemistry
- 4 - FNR 2040 Soil Information Systems or
- 4 - PES 2020 Soils

15

**Second Semester**

- 3 - GEN 3000 Fundamental Genetics
- 3 - WFB (BIOL) 3130 Conservation Biology
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Physical Environment Requirement<sup>2</sup>
- 3 - Taxonomy/Habitat Requirement<sup>3</sup>

15

**Junior Year****First Semester**

- 3 - BIOL 3350 Evolutionary Biology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Ecology Requirement<sup>4</sup>
- 3 - Natural Resource Economics Requirement<sup>5</sup>
- 3 - Taxonomy/Habitat Requirement<sup>3</sup>

15

**Second Semester**

- 3 - ENGL 3140 Technical Writing
- 3 - ENR 3020 Natural Resources Measurements
- 3 - Ecology Requirement<sup>4</sup>
- 3 - Physiology Requirement<sup>6</sup>
- 3 - Taxonomy/Habitat Requirement<sup>3</sup>

15

**Senior Year****First Semester**

- 3 - FOR (ENR) 4340 GIS for Landscape Planning
  - 3 - Conservation Policy/Law Requirement<sup>7</sup>
  - 3 - Internship, Creative Inquiry or Directed Research Requirement<sup>8</sup>
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Taxonomy/Habitat Requirement<sup>3</sup>
- 
- 15

**Second Semester**

- 3 - ENR (BIOL) 4130 Restoration Ecology
  - 3 - ENR 4500 Conservation Issues
  - 1 - FOR 4980 Senior Portfolio *or*
  - 1 - WFB 4980 Senior Portfolio
  - 6 - Taxonomy/Habitat Requirement<sup>3</sup>
  - 2 - Elective
- 
- 15

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

<sup>2</sup>GEOG 1060, GEOL 1010, or PHYS 2400

<sup>3</sup>AGM 3010, BIOL 3020/3060, 3030/3070, 3040/3080, 3050/3090, 3200, 4060/4070, 4100/4110, 4170, 4420, 4640, 4680, 4720, 4770, 4860, ENT (BIOL) 3010, (BIOL, WFB) 4690, FOR 2510, 4060, GEOL 1120, 1140, 2100, 4030, MICR 4030, PES 4040, WFB 3000, 4180, 4400, 4620 or 4760. At least four of the courses must be laboratories or courses with a required laboratory component.

<sup>4</sup>BIOL 4410, 4420, 4430, 4460, 4700, or FNR 4660

<sup>5</sup>APEC 3570, 4330, 4750, or FOR 3040

<sup>6</sup>AVS 3010, BIOL 4010/4020, 4580, 4750, or (AVS) 4800

<sup>7</sup>ENR 4290, FOR 4000, (ENR) 4160, or WFB 4300

<sup>8</sup>Internship (FNR 4900); Creative Inquiry (FNR 4700); Directed Research (WFB 4630); or Senior Honors Thesis (FNR 4910).

## NATURAL RESOURCE AND ECONOMIC POLICY CONCENTRATION

**Sophomore Year****First Semester**

- 3 - APEC 2570 Natural Resources, Environment and Economics *or*
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - POSC 1010 American National Government *or*
  - 3 - POSC 1020 Intro. to International Relations
  - 3 - Geography Requirement<sup>1</sup>
  - 3 - Natural Science Requirement<sup>2</sup>
  - 3 - Elective
- 
- 15

**Second Semester**

- 3 - APEC 3570 Natural Res. Economics
  - 3 - ECON 2120 Principles of Macroeconomics
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
  - 3 - Elective
- 
- 15

**Junior Year****First Semester**

- 3 - ECON 3140 Intermediate Microeconomics
  - 3 - ENR 4290 Environmental Law and Policy
  - 3 - Advanced Writing Requirement<sup>4</sup>
  - 3 - Applied Economics Requirement<sup>5</sup>
  - 3 - Natural Science Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 3 - APEC 4750 Wildlife Economics
  - 3 - ENSP 4000 Studies in Environmental Science
  - 3 - STAT 4620 Statistics Applied to Economics
  - 3 - Macroeconomics Requirement<sup>6</sup>
  - 3 - Natural Science Requirement<sup>2</sup>
- 
- 15

**Senior Year****First Semester**

- 3 - APEC 4570 Natural Resource Use, Technology, and Policy
  - 3 - ECON 3190 Environmental Economics
  - 6 - Applied Economics Requirement<sup>5</sup> *or*
  - 3 - Applied Economics Requirement<sup>5</sup> *and*
  - 3 - Minor Requirement
  - 3 - Internship, Creative Inquiry or Directed Research Requirement<sup>7</sup>
- 
- 15

**Second Semester**

- 3 - ENR 4500 Conservation Issues
  - 6 - Applied Economics Requirement<sup>5</sup>
  - 3 - Community Development Requirement<sup>8</sup>
  - 3 - Elective *or*
  - 3 - Minor Requirement
- 
- 15

120 Total Semester Hours

<sup>1</sup>GEOG 1010, 1030, or 1060

<sup>2</sup>Select from any BIOL, ENR, EES, ENSP, ETOX, FOR, GEOL, PES, or WFB courses numbered 3000 or higher.

<sup>3</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

<sup>4</sup>See advisor.

<sup>5</sup>Select from any APEC courses numbered 3000 or higher.

<sup>6</sup>ECON 3020, 3100 or 3150

<sup>7</sup>Internship (APEC 4910); Creative Inquiry (APEC 4940); or Directed Research (PES 4910 or 4920).

<sup>8</sup>RS 4010 or 4590

## NATURAL RESOURCES MANAGEMENT CONCENTRATION

**Sophomore Year****First Semester**

- 4 - FNR 2040 Soil Information Systems *or*
  - 4 - PES 2020 Soils
  - 2 - FOR 2050 Dendrology
  - 3 - FOR 2210 Forest Biology
  - 3 - WFB 3000 Wildlife Biology
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 
- 15

**Second Semester**

- 3 - ENR 3020 Natural Resources Measurements
  - 3 - FOR 2060 Forest Ecology
  - 3 - WFB 3500 Principles of Fish and Wildlife Biol.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 15

**Junior Year****First Semester**

- 3 - APEC 2570 Natural Resources, Environment and Economics *or*
  - 3 - ECON 2110 Principles of Microeconomics
  - 4 - BIOL 3200 Field Botany *or*
  - 3 - BIOL 4060 Intro. Plant Taxonomy *and*
  - 1 - BIOL 4070 Plant Taxonomy Lab.
  - 3 - ENR 4290 Environmental Law and Policy *or*
  - 3 - FOR 4000 Public Relations in Natural Res.
  - 3 - Minor Requirement<sup>2</sup>
  - 3 - Elective
- 
- 16

**Second Semester**

- 3 - APEC 3570 Natural Res. Economics
  - 3 - GEOL 1010 Physical Geology
  - 1 - GEOL 1030 Physical Geology Lab.
  - 3 - WFB (BIOL) 3130 Conservation Biology
  - 6 - Minor Requirement<sup>2</sup>
- 
- 16

**Senior Year****First Semester**

- 3 - FOR (ENR) 4160 Forest Policy and Admin.
  - 3 - FOR (ENR) 4340 GIS for Landscape Planning
  - 3 - Internship, Creative Inquiry or Directed Research Requirement<sup>3</sup>
  - 3 - Minor Requirement<sup>2</sup>
  - 3 - Elective
- 
- 15

**Second Semester**

- 3 - ENR 4500 Conservation Issues
  - 3 - ENGL 3140 Technical Writing
  - 2 - FOR 4060 Forested Watershed Management
  - 1 - FOR 4980 Senior Portfolio *or*
  - 1 - WFB 4980 Senior Portfolio
  - 3 - WFB 4620 Wetland Wildlife Biology
  - 3 - Minor Requirement<sup>2</sup>
- 
- 15

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

<sup>2</sup>A minor is required and must be selected from the following: Biochemistry; Biological Sciences; Chemistry; Crop and Soil Environmental Science; Environmental Science and Policy; Forest Resource Management; Geology; Horticulture; Legal Studies; Microbiology; Natural Resource Economics; Non-profit Leadership; Park and Protected Area Management; Therapeutic Recreation; Travel and Tourism; Urban Forestry; Wildlife and Fisheries Biology.

<sup>3</sup>Internship (FNR 4900); Creative Inquiry (FNR 4700); or Directed Research (FNR 4910 or WFB 4630).

**FOOD SCIENCE****Bachelor of Science**

Food Science majors apply principles of basic and applied sciences to design and manufacture safe and quality foods in addition to identifying the relationship between nutrients and human health. The curriculum allows flexibility for concentrating in one of two areas:

In the Food Science and Technology Concentration, students may emphasize business, culinary science (one of three national programs that have been approved by the Research Chef's Association as Culinology™), engineering, food packaging, and additional sciences that complement requirements of the Institute of Food Technologists.

Food processing industries, ingredient manufacturers, and packaging suppliers employ graduates in new food product development, quality assurance, production management, and technical sales. State and federal agencies also need graduates for food safety and regulatory positions.

The Nutrition and Dietetics Concentration prepares students for graduate study in nutrition and a variety of health related fields as well as dietetic internship programs to become a Registered Dietitian.

Examples of career opportunities include employment as dietitians, nutritionists, consultants and food specialists. The Nutrition and Dietetics curriculum is accredited by the Accreditation Council for Education of Nutrition and Dietetics (ACEND).

The Department of Food, Nutrition and Packaging Sciences also offers an accelerated five-year combined bachelor's/master's program that allows students to count up to twelve hours of graduate credit toward both the BS degree in Food Science and the MS degree in Food, Nutrition and Culinary Sciences. Details are available from the Department of Food, Nutrition and Packaging Sciences or at [www.clemson.edu/fnps](http://www.clemson.edu/fnps).

## FOOD SCIENCE AND TECHNOLOGY CONCENTRATION

### Freshman Year

#### First Semester

- 3 - BIOL 1030 General Biology I and
  - 1 - BIOL 1050 General Biology Lab. I or
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 1 - FDSC 1010 Epochs in Man's Struggle for Food
  - 3 - MATH 1020 Intro. to Math. Analysis or
  - 4 - MATH 1060 Calculus of One Variable I
- 15-17

#### Second Semester

- 3 - BIOL 1040 General Biology II and
  - 1 - BIOL 1060 General Biology Lab. II or
  - 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 1 - FDSC 1020 Perspectives in Food and Nutrition Sciences
  - 1 - FDSC 4500 Creative Inquiry
  - 3 - PSYC 2010 Introduction to Psychology
- 16-17

## Sophomore Year

### First Semester

- 3 - CH 2010 Survey of Organic Chemistry and
  - 1 - CH 2020 Survey of Organic Chemistry Lab. or
  - 3 - CH 2230 Organic Chemistry and
  - 1 - CH 2270 Organic Chemistry Lab.
  - 1 - FDSC 4500 Creative Inquiry
  - 3 - PHYS 1220 Physics with Calculus I and
  - 1 - PHYS 1240 Physics Lab. I or
  - 4 - PHYS 2000 Introductory Physics or
  - 3 - PHYS 2070 General Physics I and
  - 1 - PHYS 2090 General Physics I Lab.
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1,2</sup>
- 15

### Second Semester

- 3 - BCHM 3050 Essential Elements of Biochem.
  - 2 - BIOL 4340 Biological Chemistry Lab. Techniq.
  - 3 - FDSC 2140 Food Resources and Society
  - 1 - FDSC 4500 Creative Inquiry
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 2 - Elective
- 17

## Junior Year

### First Semester

- 1 - FDSC 3010 Food Regulations and Policy
  - 1 - FDSC 4170 Seminar
  - 1 - FDSC 4500 Creative Inquiry
  - 4 - MICR 3050 General Microbiology
  - 3 - NUTR 4510 Human Nutrition
  - 3 - Departmental Requirement<sup>3</sup>
  - 2 - Emphasis Area Requirement<sup>4</sup>
- 15

### Second Semester

- 3 - ENGL 3040 Business Writing or
  - 3 - ENGL 3140 Technical Writing
  - 2 - FDSC 4030 Food Chemistry and Analysis
  - 4 - FDSC 4100 Food Product Development
  - 1 - FDSC 4500 Creative Inquiry
  - 4 - MICR 4070 Food and Dairy Microbiology
  - 3 - Emphasis Area Requirement<sup>4</sup>
- 17

## Senior Year

### First Semester

- 3 - FDSC 3060 Food Service Operations or
  - 3 - FDSC 3070 Restaurant Food Service Mgt.
  - 3 - FDSC 4010 Food Chemistry I
  - 3 - FDSC 4040 Food Preservation and Processing
  - 2 - FDSC 4070 Quantity Food Production
  - 1 - FDSC 4500 Creative Inquiry
  - 3 - Emphasis Area Requirement<sup>4</sup>
- 15

### Second Semester

- 3 - FDSC 4020 Food Chemistry II
  - 4 - FDSC 4080 Food Process Engineering
  - 3 - FDSC (PKSC) 4090 Total Quality Mgt. for the Food and Packaging Industries
  - 1 - FDSC 4500 Creative Inquiry
  - 3 - Emphasis Area Requirement<sup>4</sup>
- 14
- 124-127 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>For students undecided on concentration area, APEC 2020, ECON 2110, or 2120 is recommended.

<sup>3</sup>FDSC 4300 or AVS 4130

<sup>4</sup>See advisor.

## NUTRITION AND DIETETICS CONCENTRATION

### Freshman Year

#### First Semester

- 3 - BIOL 1030 General Biology I and
  - 1 - BIOL 1050 General Biology Lab. I or
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 1 - FDSC 1010 Epochs in Man's Struggle for Food
  - 3 - MATH 1020 Intro. to Math. Analysis or
  - 4 - MATH 1060 Calculus of One Variable I
- 15-17

#### Second Semester

- 3 - BIOL 1040 General Biology II and
  - 1 - BIOL 1060 General Biology Lab. II or
  - 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 1 - FDSC 1020 Perspectives in Food and Nutrition Sciences
  - 3 - PSYC 2010 Introduction to Psychology<sup>1</sup>
- 15-16

## Sophomore Year

### First Semester

- 3 - APEC 2020 Agricultural Economics or
  - 3 - ECON 2110 Principles of Microeconomics or
  - 3 - ECON 2120 Principles of Macroeconomics
  - 3 - CH 2010 Survey of Organic Chemistry and
  - 1 - CH 2020 Survey of Organic Chemistry Lab. or
  - 3 - CH 2230 Organic Chemistry and
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - NUTR 2030 Principles of Human Nutrition
  - 1 - NUTR 2160 Current Issues in Nutrition
  - 3 - PHYS 1220 Physics with Calculus I and
  - 1 - PHYS 1240 Physics Lab. I or
  - 4 - PHYS 2000 Introductory Physics or
  - 3 - PHYS 2070 General Physics I and
  - 1 - PHYS 2090 General Physics I Lab.
- 15

### Second Semester

- 3 - BCHM 3050 Essential Elements of Biochem.
  - 2 - BIOL 4340 Biological Chemistry Lab. Techniq.
  - 3 - NUTR 2040 Life Cycle Nutrition
  - 3 - STAT 2300 Stastical Methods I
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 17

## Junior Year

### First Semester

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 1 - FDSC 3010 Food Regulations and Policy
  - 1 - FDSC 4500 Creative Inquiry
  - 4 - MICR 3050 General Microbiology
  - 3 - NUTR 4510 Human Nutrition
  - 2 - Elective
- 15

**Second Semester**

- 4 - BIOL 2230 Human Anatomy and Phys. II
- 3 - FDSC 3060 Food Service Operations
- 1 - FDSC 4500 Creative Inquiry
- 4 - MICR 4070 Food and Dairy Microbiology
- 1 - NUTR 4180 Professional Dev. in Dietetics or  
1 - NUTR 4190 Professional Dev. In Nutrition<sup>2</sup>
- 3 - NUTR 4550 Nutrition and Metabolism

**Senior Year****First Semester**

- 3 - ENGL 3040 Business Writing or  
3 - ENGL 3140 Technical Writing
- 3 - FDSC 4010 Food Chemistry I
- 3 - FDSC 4040 Food Preservation and Processing
- 2 - FDSC 4070 Quantity Food Production
- 4 - NUTR 4240 Medical Nutrition Therapy I

**Second Semester**

- 3 - FDSC 4020 Food Chemistry II
- 2 - FDSC 4030 Food Chemistry and Analysis
- 3 - FDSC (PKSC) 4090 Total Quality Mgt. for  
the Food and Packaging Industries
- 4 - NUTR 4250 Medical Nutrition Therapy II
- 3 - NUTR 4260 Community Nutrition
- 1 - NUTR 4270 Nutrition Counseling

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124-127 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>NUTR 4190 is recommended for students not pursuing registered dietitian (RD) status.

**FOREST RESOURCE MANAGEMENT****Bachelor of Science**

The Forest Resource Management curriculum combines a broad education in the arts and sciences with applied forest sciences. This combination provides the necessary foundation for the scientific management of forest resources, products, and services.

Foresters are qualified for a broad spectrum of employment opportunities in the public and private sectors. They may be engaged as managers, administrators, or owners of forest lands or forest-based businesses; as technical specialists in the production of timber, usable water, wildlife, and aesthetic values, and in the recreational use of the forest; or as professionals in other areas where the conservation of natural resources is a concern. Foresters earning advanced degrees find employment in academic work and in research conducted by public and private agencies.

The curriculum, accredited by the Society of American Foresters, provides a strong program in the basic knowledge and skills required of a professional forester. Forest Resource Management majors will select a minor (see page 63). The curriculum also provides the necessary prerequisites for graduate study.

For students interested in conservation biology, water, and natural resources, the School of Agricultural, Forest and Environmental Sciences also administers the Conservation Biology Concentration and the Natural Resources Management Concentration within the Environmental and Natural Resources degree program. See pages 51-52 for program details.

**Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 4 - CH 1010 General Chemistry
- 1 - ENR 1010 Intro. to Environ. and Natural Res. I
- 3 - MATH 1020 Intro. to Mathematical Analysis
- 3 - Oral Communication Requirement<sup>1</sup>

15

**Second Semester**

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 3 - ENGL 1030 Accelerated Composition
- 1 - FNR 1020 FNR Freshman Portfolio
- 3 - STAT 2300 Statistical Methods I
- 4 - Departmental Science Requirement<sup>2</sup>

15

**Sophomore Year****First Semester**

- 4 - FNR 2040 Soil Information Systems
- 2 - FOR 2050 Dendrology
- 3 - FOR 2210 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Economics Requirement<sup>3</sup>

15

**Second Semester**

- 3 - ENGL 3140 Technical Writing
- 3 - FOR 2060 Forestry Ecology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Minor Requirement<sup>4</sup>

15

**Forestry Summer Camp**

- 2 - FOR 2510 Forest Communities
- 1 - FOR 2520 Forest Operations
- 4 - FOR 2530 Forest Mensuration
- 1 - FOR 2540 Forest Products

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**Junior Year****First Semester**

- 2 - FOR 3020 Forest Biometrics
- 3 - FOR 3040 Forest Resource Economics
- 3 - FOR 3410 Wood Procurement Practices in the  
Forest Industry
- 4 - FOR 4130 Integrated Forest Pest Management
- 3 - FOR (ENR) 4340 GIS for Landscape Planning
- 1 - Internship, Creative Inquiry or Directed  
Research Requirement<sup>5</sup>

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**Second Semester**

- 2 - FOR 3080 Remote Sensing in Forestry
- 3 - FOR 4080 Wood and Paper Products
- 3 - FOR 4180 Forest Resource Valuation
- 4 - FOR 4650 Silviculture
- 3 - Minor Requirement<sup>4</sup>
- 1 - Internship, Creative Inquiry or Directed  
Research Requirement<sup>5</sup>

16

**Senior Year****First Semester**

- 4 - FOR 4100 Harvesting Processes
- 3 - FOR (ENR) 4160 Forest Policy and Admin.
- 3 - FOR 4170 Forest Resource Mgt. and Regulation
- 2 - FOR 4310 Recreation Resource Planning in  
Forest Management
- 3 - Minor Requirement<sup>4</sup>
- 1 - Internship, Creative Inquiry or Directed  
Research Requirement<sup>5</sup>

16

**Second Semester**

- 1 - FNR 4990 Natural Resources Seminar
- 2 - FOR 4060 Forested Watershed Management
- 3 - FOR 4150 Forest Wildlife Management
- 2 - FOR 4250 Forest Resource Management Plans
- 1 - FOR 4980 Senior Portfolio
- 6 - Minor Requirement<sup>4</sup>

15

131 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

<sup>2</sup>See advisor. CH 1020 or PHYS 2000 or higher level general physics course.

<sup>3</sup>APEC 2570, ECON 2000, 2110, or 2120.

<sup>4</sup>To be selected by the middle of the sophomore year.

<sup>5</sup>FNR 4700, 4900, or FOR 4190.

**LAND SURVEYING EMPHASIS AREA****Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 4 - CH 1010 General Chemistry
- 1 - ENR 1010 Intro. to Environ. and Natural Res. I
- 3 - MATH 1020 Intro. to Mathematical Analysis
- 3 - Oral Communication Requirement<sup>1</sup>

15

**Second Semester**

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 3 - ENGL 1030 Accelerated Composition
- 1 - FNR 1020 FNR Freshman Portfolio
- 3 - STAT 2300 Statistical Methods I
- 4 - Departmental Science Requirement<sup>2</sup>

15

**Sophomore Year****First Semester**

- 4 - FNR 2040 Soil Information Systems
- 2 - FOR 2050 Dendrology
- 3 - FOR 2210 Forest Biology
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Economics Requirement<sup>3</sup>

15

**Second Semester**

- 2 - ENGR 2100 Engr. Graphics for Civil Engr.
- 3 - ENGL 3140 Technical Writing
- 3 - FOR 2060 Forestry Ecology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>

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**Forestry Summer Camp**

- 2 - FOR 2510 Forest Communities
  - 1 - FOR 2520 Forest Operations
  - 4 - FOR 2530 Forest Mensuration
  - 1 - FOR 2540 Forest Products
- 

**Junior Year****First Semester**

- 2 - FOR 3020 Forest Biometrics
  - 3 - FOR 3040 Forest Resource Economics
  - 3 - FOR 3410 Wood Procurement Practices in the Forest Industry
  - 4 - FOR 4130 Integrated Forest Pest Management
  - 3 - FOR (ENR) 4340 GIS for Landscape Planning
- 

**Second Semester**

- 3 - AGM 2210 Surveying: Earthwork and Area Measurements
  - 2 - FOR 3080 Remote Sensing in Forestry
  - 3 - FOR 4080 Wood and Paper Products
  - 3 - FOR 4180 Forest Resource Valuation
  - 4 - FOR 4650 Silviculture
- 

**Summer**

- 3 - FNR 4900 Field Training in Natural Resources<sup>†</sup>

**Senior Year****First Semester**

- 4 - FOR 4100 Harvesting Processes
  - 3 - FOR (ENR) 4160 Forest Policy and Admin.
  - 3 - FOR 4170 Forest Resource Mgt. and Regulation
  - 2 - FOR 4310 Rec. Resource Plan. in Forest Mgt.
  - 3 - FOR 4330 GPS Applications
- 

**Second Semester**

- 3 - BE 3220 Small Watershed Hydrology and Sedimentology
  - 1 - FNR 4990 Natural Resources Seminar
  - 2 - FOR 4060 Forested Watershed Management
  - 3 - FOR 4150 Forest Wildlife Management
  - 2 - FOR 4250 Forest Resource Management Plans
  - 1 - FOR 4980 Senior Portfolio
  - 3 - LAW 3330 Real Estate Law
- 

130 Total Semester Hours

<sup>†</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. (Note: Social Science Requirement must be in an area other than economics or applied economics.)

<sup>‡</sup>See advisor. CH 1020 or PHYS 2000 or higher level general Physics course. PHYS 2000 is highly recommended.

<sup>§</sup>APEC 2570, ECON 2000, 2110, or 2120

<sup>¶</sup>Summer internship must be in land surveying.

**GENETICS****Bachelor of Science**

Genetics is the study of heredity. Genetics research takes many forms, from the study of heredity at the level of individual molecules to study at the level of cells and chromosomes, individuals, or populations. To comprehend current genetic information and to make future contributions to our molecular understanding of life processes, students must obtain a broad background in biology and a firm foundation

in chemistry and mathematics. This is the basis of the genetics curriculum.

A degree in Genetics is a strong preparation for many careers. The degree provides an excellent foundation for medical, veterinary, or pharmacy school, as well as graduate research in any discipline related to biology, including bioinformatics, forensic technology, and genetic counseling. Because of the increasing emphasis on genetics in everyday life, a Bachelor of Science in Genetics can also be a direct path to a career in the emerging biotechnology industries (pharmaceuticals, agricultural technologies, biomimetic minerals) in research, sales, or business operations. Combined with a law degree, a genetics bachelor of science is a good background for a career as a patent attorney.

**Freshman Year****First Semester**

- 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 1 - GEN 1030 Careers in Biochem. and Genetics
  - 4 - MATH 1060 Calculus of One Variable I
- 

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1080 Calculus of One Variable II
- 

**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - COMM 1500 Intro. to Human Comm. or 3 - COMM 2500 Public Speaking
  - 3 - GEN 3020 Molecular and General Genetics
  - 3 - PHYS 1220 Physics with Calculus I<sup>1</sup>
  - 1 - PHYS 1240 Physics Lab. I<sup>1</sup>
- 

**Second Semester**

- 3 - BCHM 3010 Molecular Biochemistry
  - 2 - BCHM 3020 Molecular Biochemistry Lab.
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 

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**Junior Year****First Semester**

- 3 - GEN 4200 Molecular Genetics and Gene Reg.
  - 2 - GEN 4210 Molecular Genetics and Gene Regulation Lab.
  - 3 - GEN (BCHM) 4400 Bioinformatics
  - 3 - Science Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 

**Second Semester**

- 3 - BIOL 4610 Cell Biology
  - 3 - GEN 4100 Population and Quantitative Gen.
  - 2 - GEN 4110 Population and Quantitative Gen. Lab.
  - 3 - PHIL 3260 Science and Values
  - 3 - Genetics Requirement<sup>5</sup>
  - 3 - Elective<sup>6</sup>
- 

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**Senior Year****First Semester**

- 3 - GEN 4500 Comparative Genetics
  - 3 - Genetics Requirement<sup>5</sup>
  - 3 - Science Requirement<sup>4</sup>
  - 6 - Elective<sup>6</sup>
- 

**Second Semester**

- 2 - GEN 4930 Senior Seminar
  - 3 - Genetics Requirement<sup>5</sup>
  - 3 - Science Requirement<sup>4</sup>
  - 6 - Elective<sup>6</sup>
- 

122 Total Semester Hours

<sup>1</sup>Medical, veterinary, and graduate school requirements often include two semesters of physics with calculus and the physics laboratory. Students are encouraged to check requirements for admission to professional postgraduate programs.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>See General Education Requirements. Three of the Social Science Requirement credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>4</sup>BIOL 2220, 2230, PHYS 2080, 2100, 2210, 2230, or any courses at 3000 level or above in BCHM, BIOE, BIOL, CH, GEN, MATH, MICR, PHYS, and STAT. Other courses must be approved by advisor. A maximum of nine credit hours from undergraduate research courses (4910, creative inquiry or similar courses) may be used towards the combined science and genetics requirements.

<sup>5</sup>AVS 4700, BCHM 4310, 4320, 4330, 4340, 4360, 4430, 4910, BIOL 3350, 4400, 4500, (PLPA) 4540, 4560, 4570, GEN 4700, 4910, MICR 3050, 4150, 4170, PES 4050.

<sup>6</sup>Two semesters of a foreign language are strongly recommended.

**Notes:**

1. A student is allowed to enroll in science and mathematics courses only when all prerequisites have been passed with a grade of C or better.
2. A minimum grade of C is required in all science and mathematics courses. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any science or mathematics course.

**HORTICULTURE****Bachelor of Science**

Horticulture connects plants and people to improve our world, be it through the enhancement of the foods we eat, the creation of healthy natural living spaces, the economic and aesthetic enhancement of our homes and communities, or the application of green solutions to the challenges of environmental quality. The plants of horticulture are the foundation of human and environmental well being, and it is horticulture professionals who have the knowledge, skills, and passion to utilize those plants for the betterment of humankind.

The Horticulture degree program includes courses in science, mathematics, business, leadership, law, and communication, combined with a strong foundation in horticultural sciences and arts. The curriculum provides the flexibility to choose courses within those categories that best support the student's personal interests, goals, and success. Career opportunities are endless.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Internships are excellent opportunities to learn and explore potential careers.

**Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CH 1010 General Chemistry
  - 3 - HORT 1010 Horticulture
  - 4 - Spanish Language Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1020 Intro. to Mathematical Analysis
  - 3 - Business Requirement<sup>1</sup>
- 17

**Sophomore Year****First Semester**

- 3 - HORT 2100 Growing Garden Plants in the Fall
  - 3 - HORT 3030 Landscape Plants
  - 3 - MATH 1010 Essential Math. for Informed Soc.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 4 - Plant Biology Requirement<sup>1</sup>
- 16

**Second Semester**

- 3 - HORT 2110 Growing Plants in the Spring
  - 4 - PES 2020 Soils
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 13

**Summer**

- 3 - HORT 2710 Internship<sup>3</sup> or
- 3 - HORT 4710 Advanced Internship<sup>3</sup>

**Junior Year****First Semester**

- 3 - HORT 3080 Sustainable Landscape Garden Design
  - 3 - Business Requirement<sup>1</sup>
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>2</sup>
  - 3 - Related Science Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - BIOL 4010 Plant Physiology
  - 1 - BIOL 4020 Plant Physiology Lab
  - 3 - HORT 4040 Plant Propagation
  - 1 - HORT 4050 Plant Propagation Techniques Lab.
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 1 - Elective
- 15

**Senior Year****First Semester**

- 3 - HORT 4090 Senior Capstone Course
  - 3 - Business Requirement<sup>1</sup>
  - 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 3 - Related Science Requirement<sup>1</sup>
  - 3 - Elective
- 15

**Second Semester**

- 3 - Horticulture Specialization Requirement<sup>1</sup>
  - 6 - Related Science Requirement<sup>1</sup>
  - 3 - Elective
- 12

121 Total Semester Hours

<sup>1</sup>See advisor. Select from department-approved list.

<sup>2</sup>See General Education Requirements. The Cross-Cultural Awareness Requirement and Science and Technology in Society General Education requirements must also be satisfied through these courses.

<sup>3</sup>Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HORT 3030. Prior approval is required for internships, and a 2.0 grade-point average is required for registration.

Note: Horticulture majors must earn a C or better in all HORT classes.

**MICROBIOLOGY****Bachelor of Science**

Microbiology deals with the study of bacteria, viruses, yeasts, filamentous fungi, protozoa, and unicellular algae. Microbiologists seek to describe these organisms in terms of their structures, functions, and processes of reproduction, growth, and death at both the cellular and molecular levels. They are also concerned with their ecology, particularly in regard to their pathological effects on man, and with their economic importance.

The Microbiology major provides a thorough training in the basic microbiological skills. Further, students receive instruction in mathematics, physics, chemistry, and biochemistry, all essential to the training of a modern microbiologist. Students can prepare for a variety of careers through a wide choice of electives. The Microbiology curriculum with a Biomedicine Concentration is recommended for students planning postgraduate programs. Microbiology graduates may enter graduate school in microbiology, biochemistry, bioengineering, or related disciplines; they may enter medical or dental schools or pursue careers in one of the many industries or public service departments dependent upon microbiology. Some of these are the fermentation and drug industries, medical and public health microbiology, various food industries, and agriculture.

Microbiology majors planning to apply for admission to a medical or dental school should inform their advisors immediately upon entering the program.

**Freshman Year****First Semester**

- 1 - BIOL 1010 Frontiers in Biology I or
  - 1 - MICR 1010 Microbes and Human Affairs
  - 5 - BIOL 1100 Principles of Biology I<sup>1</sup>
  - 4 - CH 1010 General Chemistry
  - 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 4 - MATH 1060 Calculus of One Variable I
- 17

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II<sup>1</sup>
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3-4 - Mathematical Sciences Requirement<sup>2</sup>
- 15-16

**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>3</sup>
  - 3 - Elective<sup>4</sup>
- 16

**Second Semester**

- 2 - BIOL 4340 Biol. Chemistry Lab. Techniques
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
  - 3 - Biochemistry Requirement<sup>5</sup>
  - 4 - General Microbiology Requirement<sup>6</sup>
- 16

**Junior Year****First Semester**

- 3 - MICR 4010 Microbial Diversity and Ecology
  - 3 - PHYS 1220 Physics with Calculus I and
  - 1 - PHYS 1240 Physics Lab. I or
  - 3 - PHYS 2070 General Physics I and
  - 1 - PHYS 2090 General Physics I Lab.
  - 6 - Microbiology Requirement<sup>7</sup>
  - 3 - Elective<sup>4</sup>
- 16

**Second Semester**

- 3 - MICR 4120 Bacterial Physiology
  - 2 - MICR 4500 Advanced Micro Lab I
  - 3 - Microbiology Requirement<sup>7</sup>
  - 3 - Social Science Requirement<sup>3</sup>
  - 3 - Elective<sup>4,8</sup>
- 14

**Senior Year****First Semester**

- 3 - BIOL 4610 Cell Biology
  - 3 - MICR 4150 Microbial Genetics
  - 2 - MICR 4510 Advanced Micro Lab II
  - 3 - Virology Requirement<sup>9</sup>
  - 3 - Elective<sup>4</sup>
- 14

**Second Semester**

- 2 - MICR 4520 Advanced Micro Lab III
  - 2 - MICR 4930 Senior Seminar
  - 3 - Microbiology Requirement<sup>7</sup>
  - 9 - Elective<sup>4</sup>
- 16

124-125 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1-2 credits required must be satisfied by completing 1-2 extra credits from departmental course offerings at the 3000 level or above. See advisor.

<sup>2</sup>MATH 1110 or STAT 2300 or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.

<sup>3</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>4</sup>Elective hours may be used toward satisfying the requirements of a minor.

<sup>5</sup>BCHM 3010 or 3050, or other approved coursework at the 2000 level or higher.



<sup>6</sup>MICR 3050 or other approved coursework at the 2000 level or higher.

<sup>7</sup>See advisor. Minimum of 12 credits is required. At least one course must be selected from each of the following fields:

*Biomedicine*—BIOL 3150, 4200, 4340, 4560/4570, 4670, 4840, 4890, GEN 3000, HLTH 3800, MICR 4000, 4050, 4110, (AVS, BIOL) 4140, 4170

*Environmental*—BIOL (PLPA) 4250, MICR 4020, 4030, 4100

*Food Safety, Industrial, and Technology*—BIOL 4870, MICR 4070, 4130

<sup>8</sup>Students planning to apply to medical/dental schools should take PHYS 2080 and 2100 during the second semester of the junior year.

<sup>9</sup>BIOL 4540 or MICR 4160

## BIOMEDICINE CONCENTRATION

### Freshman Year

#### First Semester

- 1 - BIOL 1010 Frontiers in Biology I *or*
    - 1 - MICR 1010 Microbes and Human Affairs
  - 5 - BIOL 1100 Principles of Biology I<sup>1</sup>
  - 4 - CH 1010 General Chemistry
    - 3 - COMM 1500 Intro. to Human Comm. *or*
      - 3 - COMM 2500 Public Speaking
  - 4 - MATH 1060 Calculus of One Variable I
- 17

#### Second Semester

- 5 - BIOL 1110 Principles of Biology II<sup>1</sup>
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3-4 - Mathematical Sciences Requirement<sup>2</sup>
- 15-16

### Sophomore Year

#### First Semester

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>3</sup>
  - 3 - Elective<sup>4</sup>
- 16

#### Second Semester

- 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
  - 3 - Biochemistry Requirement<sup>5</sup>
  - 3 - Biomedicine Requirement<sup>6</sup>
  - 4 - General Microbiology Requirement<sup>7</sup>
- 17

### Junior Year

#### First Semester

- 3 - BIOL 4610 Cell Biology
  - 2 - BIOL 4620 Cell Biology Lab.
  - 3 - MICR 4010 Microbial Diversity and Ecology
  - 3 - PHYS 1220 Physics with Calculus I *and*
  - 1 - PHYS 1240 Physics Lab. I *or*
    - 3 - PHYS 2070 General Physics I *and*
      - 1 - PHYS 2090 General Physics I Lab.
  - 3 - Genetics Requirement<sup>8</sup>
- 15

### Second Semester

- 3 - MICR 4120 Bacterial Physiology
  - 2 - MICR 4500 Advanced Micro Lab I
  - 3 - PHYS 2080 General Physics II *and*
  - 1 - PHYS 2100 General Physics II Lab. *or*
    - 3 - PHYS 2210 Physics with Calculus II *and*
      - 1 - PHYS 2230 Physics Lab. II
  - 3 - Social Science Requirement<sup>3</sup>
  - 3 - Elective<sup>4</sup>
- 15

### Senior Year

#### First Semester

- 3 - MICR 4140 Basic Immunology
  - 3 - MICR 4150 Microbial Genetics
  - 3 - MICR 4160 Introductory Virology
  - 2 - MICR 4510 Advanced Micro Lab II
  - 3 - Biomedicine Requirement<sup>6</sup>
- 14

#### Second Semester

- 3 - MICR 4110 Pathogenic Bacteriology
  - 3 - MICR 4170 Molecular Mechanisms of Carcinogenesis and Aging
  - 2 - MICR 4520 Advanced Micro Lab III
  - 2 - MICR 4930 Senior Seminar
  - 3 - Biomedicine Requirement<sup>6</sup>
  - 3 - Elective<sup>4</sup>
- 16

#### 125–126 Total Semester Hours

<sup>1</sup>BIOL 1100 and 1110 are strongly recommended; however, BIOL 1030/1050 may substitute for BIOL 1100, and BIOL 1040/1060 may substitute for BIOL 1110. The remaining 1–2 credits required must be satisfied by completing 1–2 extra credits from departmental course offerings at the 3000 level or above. See advisor.

<sup>2</sup>MATH 1110 or STAT 2300 or other approved coursework. See advisor. Medical and dental schools have different mathematics requirements.

See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

Elective hours may be used toward satisfying the requirements of a minor.

<sup>5</sup>BCHM 3010 or 3050, or other approved coursework at the 2000 level or higher.

<sup>6</sup>See advisor. Minimum 9 hours required. BCHM 4230, 4320, BIOL 3150, 4200, (PLPA) 4250, 4340, 4560, 4570, 4670, 4840, 4890, HLTH 3800, MICR 4000, 4050, or 4910.

<sup>7</sup>MICR 3050 or other approved coursework at the 2000 level or higher.

<sup>8</sup>GEN 3000 or 3020, or other approved coursework.

## PACKAGING SCIENCE

### Bachelor of Science

The Bachelor of Science degree in Packaging Science prepares students for careers in industries producing and utilizing packages for all types of products. Packaging is an essential part of industrialized economies, protecting, preserving, and helping to market products. The field of packaging is highly competitive and highly innovative, requiring an ever-increasing number of professional positions.

Opportunities for employment include a wide variety of career paths such as manufacturing, marketing, sales, design, purchasing, quality assurance, and customer services. Most career opportunities are in positions requiring technical knowledge combined with marketing and management skills.

The core curriculum assures graduates of having the skills and knowledge required by most entry-level packaging positions. Emphasis area choices or minors allow students to select courses to improve career preparation for specific industry segments, including: Distribution, Transportation and Engineering Technology; Food and Health Care Packaging; Materials; and Package Design and Graphics. Alternatively, any University-approved minor may be completed.

Students changing majors into Packaging Science must:

1. have an overall minimum GPA of 2.0; **and**
2. have completed four of the following courses with an average GPA of 2.7:
  - BIOL 1030, 1040, CH 1010, 1020, MATH 1060, PHYS 1220, 2070, 2080, 2210; or both MATH 1040 and 1070; **and**
3. have completed PKSC 1020 with a grade of B or higher.

### Combined Bachelor of Science/ Master of Science Degree Program

The Department of Food, Nutrition and Packaging Sciences also offers an accelerated five-year combined bachelor's/master's program that allows students to count up to twelve hours of graduate credit toward both the BS degree in Packaging Science and the MS degree in Packaging Science. Details are available from the Department of Food, Nutrition and Packaging Sciences or at [www.clemson.edu/fnps](http://www.clemson.edu/fnps).

### Freshman Year

#### First Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CH 1010 General Chemistry
  - 4 - MATH 1060 Calculus of One Variable I
  - 1 - PKSC 1010 Packaging Orientation<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 16

#### Second Semester

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab. II
  - 4 - CH 1020 General Chemistry
  - 3 - COMM 2500 Public Speaking
  - 3 - ENGL 1030 Accelerated Composition
  - 2 - PKSC 1020 Intro. to Packaging Science<sup>1</sup>
- 16

### Sophomore Year

#### First Semester<sup>3</sup>

- 3 - CH 2010 Survey of Organic Chemistry *and*
  - 1 - CH 2020 Survey of Organic Chemistry Lab. *or*
    - 3 - CH 2230 Organic Chemistry *and*
      - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - PHYS 1220 Physics with Calculus I *and*
  - 1 - PHYS 1240 Physics Lab. II *or*
    - 3 - PHYS 2070 General Physics I *and*
      - 1 - PHYS 2090 General Physics I Lab.
  - 4 - PKSC 2020 Packaging Materials and Manuf.<sup>1</sup>
  - 4 - PKSC 2200 Product/Package Design and Prototyping<sup>1</sup>
- 16

**Second Semester<sup>3</sup>**

- 3 - PHYS 2080 General Physics II and
- 1 - PHYS 2100 General Physics II Lab. or
- 3 - PHYS 2210 Physics with Calculus II and
- 1 - PHYS 2230 Physics Lab. II
- 3 - PKSC 2010 Packaging Perishable Products<sup>1</sup>
- 3 - PKSC 2040 Container Systems<sup>1</sup>
- 1 - PKSC 2060 Container Systems Lab.<sup>1</sup>
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>

**Summer**

- 0 - COOP 1010 Cooperative Education<sup>4</sup>

**Junior Year****First Semester**

- 3 - ENGL 3140 Technical Writing
- 4 - GC 1030 Graphic Comm. I for Packaging Sci.
- 3 - PKSC 4010 Packaging Machinery<sup>1</sup>
- 3 - PKSC 4040 Mechanical Properties of Packages and Principles of Protective Packaging<sup>1,5</sup>
- 1 - PKSC 4540 Product and Package Eval. Lab.<sup>1,5</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>

**Second Semester**

- 3 - PKSC 3200 Package Design Fundamentals<sup>1</sup>
- 3 - PKSC 3680 Packaging and Society<sup>1</sup>
- 3 - PKSC 4300 Converting for Flexible Packaging<sup>1</sup>
- 3 - PKSC 4400 Packaging for Distribution<sup>1</sup>
- 3 - STAT 2300 Statistical Methods I
- 3 - Emphasis Area Requirement<sup>6</sup>

**Senior Year****First Semester**

- 4 - PKSC 4160 Appl. of Polymers in Packaging<sup>1</sup>
- 4 - PKSC 4640 Food and Health Care Pkg. Syst.<sup>1</sup>
- 3 - STAT 3300 Statistical Methods II
- 3 - Emphasis Area Requirement<sup>6</sup>

**Second Semester**

- 3 - APEC 2020 Agricultural Economics or
- 3 - ECON 2110 Principles of Microeconomics
- 1 - PKSC 4030 Packaging Career Preparation<sup>1</sup>
- 3 - PKSC 4200 Package Design and Development<sup>1</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 6 - Emphasis Area Requirement<sup>6</sup>

127 Total Semester Hours

<sup>1</sup>Packaging Science majors are required to:

1. Complete PKSC 1020, 2020, 2040, and 2060 with a grade of C or better before being allowed to register for PKSC 4010, 4040, 4160, 4300, 4400, 4540, 4640.

2. Earn a C or better in all PKSC courses in order to graduate

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement. *Note:* Social Science Requirement must be in an area other than economics or applied economics. A 2000-level or higher foreign language course is recommended to satisfy the Arts and Humanities (Non-Literature) Requirement.

<sup>3</sup>Students interested in minors or emphasis areas should take any prerequisites in the sophomore year.

<sup>4</sup>At least one 15-week period of 40 hour weeks of Cooperative Education is required. A six-month period is preferred. Two 10-week summer periods of 40 hour weeks with the same company is an option.

<sup>5</sup>PKSC 4040 and 4540 must be taken concurrently.

<sup>6</sup>Completion of any emphasis area or university approved minor is required. The approved course list of the four emphasis areas is available in the departmental undergraduate student handbook or the department office. Emphasis areas consist of 15 credit hours selected from one of the following areas (additional emphasis area courses may be approved by emphasis area coordinator):

*Distribution, Transportation and Engineering Technology; Food and Health Care Packaging; Package Design and Graphics; and Materials.*

## PLANT AND ENVIRONMENTAL SCIENCES

**Bachelor of Science**

The BS degree program in Plant and Environmental Sciences is a multidisciplinary program that educates students with expertise in soils, crop sciences, and applied agricultural biotechnology. It offers students a rigorous, science-based degree with educational opportunities related to management of agricultural commodities and natural resources, as well as soil and water resources. Students can tailor the program to fit their professional and academic goals by selecting one of three concentrations.

The Agricultural Biotechnology Concentration integrates conventional disciplines with molecular advances in plants, pathogens, and biosystem interactions and responds to the educational void between the rapid adoption of biotechnology products into agricultural production and the intermediate- and end-users, farmers, and consumers. Graduates in this concentration will be competitive as scientists in emerging agricultural biotechnology industries, as educators, and as policy makers and officers in regulatory agencies.

Students with a concentration in Agronomy will graduate with comprehensive knowledge to increase farm profits by decreasing the costs of crop production; build soil tilth and fertility through rotations, multiple cropping, and nutrient cycling; protect the environment by minimizing or more efficiently using synthetic agrichemicals; manage crop pests and weeds with integrated, ecologically sound strategies; develop strategies for profitable marketing of agricultural commodities; and create a strong, diversified agriculture that is stable through market and weather fluctuations. Graduates can assume positions as self-employed farmers, farm managers, state and federal natural resource managers, research technicians, agricultural industry employees, greenhouse managers, consultants in pest management and sustainable agriculture, field ecology professionals, agritourism industry specialists, extension personnel, or regulatory officers.

Students with a concentration in Soil and Water Science can address compelling problems such as land application of agricultural and industrial wastes, reduction of contamination of ground and surface waters, establishment of functional septic drain fields, and production of food and fiber crops. Graduates will be able to establish careers in traditional agrarian fields such as soil scientists and conservationists, extension agents, and farm consultants, and in the broader environmental arenas of DHEC, consulting engineering firms, and environmental consulting. Graduates will be well prepared for graduate work in fields ranging from soil science to environmental engineering and law.

**Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I<sup>1</sup>
- 1 - BIOL 1050 General Biology Lab. I<sup>1</sup>
- 4 - CH 1010 General Chemistry
- 3 - MATH 1020 Intro. to Math. Analysis or
- 4 - MATH 1060 Calculus of One Variable I
- 3 - PES 1040 Introduction to Plant Science

**Second Semester**

- 3 - BIOL 1040 General Biology II<sup>1</sup>
- 1 - BIOL 1060 General Biology Lab II<sup>1</sup>
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>

<sup>1</sup>BIOL 1100 may substitute for BIOL 1030/1050 and BIOL 1110 may substitute for BIOL 1040/1060; BIOL 1100 and 1110 are recommended for students in the Agricultural Biotechnology Concentration.

<sup>2</sup>See General Education Requirements. PHIL 1030 is recommended for students in the Agricultural Biotechnology Concentration.

## AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

**Sophomore Year****First Semester**

- 3 - BIOL 3040 Biology of Plants
- 3 - CH 2010 Survey of Organic Chemistry
- 1 - CH 2020 Survey of Organic Chemistry Lab.
- 4 - ENT (BIOL) 3010 Insect Biology and Diversity
- 3 - PLPA 3100 Principles of Plant Pathology

**Second Semester**

- 3 - APEC 2050 Agriculture and Society
- 3 - BIOL 3350 Evolutionary Biology
- 3 - COMM 1500 Intro. to Human Comm. or
- 3 - COMM 2500 Public Speaking
- 3 - GEN 3000 Fundamental Genetics
- 4 - MICR 3050 General Microbiology
- 1 - PES 4550 Seminar

**Junior Year****First Semester**

- 3 - BCHM 3050 Essential Elements of Biochem.
- 2 - BIOL 4340 Biological Chem. Lab. Tech
- 3 - ECON 2000 Economic Concepts or
- 3 - ECON 2110 Principles of Microeconomics
- 3 - PES 3350 Agricultural Biotechnology
- 3 - PES 4220 Major World Crops
- 3 - Social Science Requirement<sup>1</sup>

**Second Semester**

- 3 - BIOL 4010 Plant Physiology
- 1 - BIOL 4020 Plant Physiology Lab.
- 3 - ENGL 3150 Scientific Writing and Comm.
- 1 - PES 4010 Academic and Professional Dev.
- 3 - PES 4050 Plant Breeding
- 3 - PES 4090 Biology of Invasive Plants

**Senior Year****First Semester**

- 2 - PES 4450 Regulatory Issues and Policies
  - 3 - PES 4900 Beneficial Soil Organisms in Plant Growth
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 6 - Concentration Requirement<sup>2</sup>
- 14

**Second Semester**

- 3 - PES 3500 Practicum
  - 3 - PES (BIOL) 3400 Medical Botany
  - 9 - Concentration Requirement<sup>2</sup>
- 15
- 122-123 Total Semester Hours

<sup>1</sup>See General Education Requirements.<sup>2</sup>Select from a department approved list. Courses to support proficiency in a foreign language also are encouraged.**AGRONOMY CONCENTRATION****Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry
  - 1 - CH 2020 Survey of Organic Chemistry Lab.
  - 4 - ENT (BIOL) 3010 Insect Biology and Diversity
  - 4 - PES 2020 Soils
  - 3 - PLPA 3100 Principles of Plant Pathology
- 15

**Second Semester**

- 3 - APEC 2050 Agriculture and Society
  - 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
  - 3 - GEN 3000 Fundamental Genetics
  - 4 - MICR 3050 General Microbiology
- 13

**Summer**

- 3 - ENT 4070 Applied Agricultural Entomology
  - 3 - PLPA 4110 Plant Disease Diagnosis I
- 6

**Junior Year****First Semester**

- 3 - APEC 2020 Agricultural Economics *or*  
3 - ECON 2110 Principles of Microeconomics
  - 3 - BCHM 3050 Essential Elements of Bioch.
  - 2 - BIOL 4340 Biol. Chem. Lab Techniques
  - 3 - IPM 4010 Principles of Integrated Pest Mgt.
  - 3 - PES 4220 Major World Crops
  - 9 - Concentration Requirement<sup>1</sup>
- 17

**Second Semester**

- 3 - BIOL 4010 Plant Physiology
  - 1 - BIOL 4020 Plant Physiology Lab.
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 1 - PES 4010 Academic and Professional Dev.
  - 3 - PES 4050 Plant Breeding
  - 3 - PES 4090 Biology of Invasive Plants
  - 1 - PES 4550 Seminar
- 15

**Senior Year****First Semester**

- 2 - PES 4450 Regulatory Issues and Policies
  - 3 - PES 4900 Beneficial Soil Organisms in Plant Growth
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Concentration Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 14

**Second Semester**

- 3 - PES 3500 Practicum
  - 3 - PES 4520 Soil Fertility and Management
  - 1 - PES 4530 Soil Fertility Lab.
  - 6 - Concentration Requirement<sup>1</sup>
- 13
- 124-125 Total Semester Hours

<sup>1</sup>Select from department-approved list.<sup>2</sup>See General Education Requirements.**SOIL AND WATER SCIENCE CONCENTRATION****Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry
  - 1 - CH 2020 Survey of Organic Chemistry Lab.
  - 3 - GEOL 1010 Physical Geology
  - 1 - GEOL 1030 Physical Geology Lab.
  - 4 - PES 2020 Soils
  - 3 - PHYS 2070 General Physics I
  - 1 - PHYS 2090 General Physics I Lab.
- 16

**Second Semester**

- 3 - APEC 2050 Agriculture and Society
  - 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
  - 4 - MICR 3050 General Microbiology
  - 3 - PHYS 2080 General Physics II
  - 1 - PHYS 2100 General Physics II Lab.
- 14

**Junior Year****First Semester**

- 3 - AGM 3010 Soil and Water Conservation
  - 3 - PES 4220 Major World Crops
  - 9 - Concentration Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - BIOL 4010 Plant Physiology and
  - 1 - BIOL 4020 Plant Physiology Lab.
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 3 - GEOL (CE) 4820 Groundwater and Contaminant Transport
  - 3 - PES (ENSP) 3150 Environment and Agric.
  - 1 - PES 4010 Academic and Professional Dev.
  - 3 - Social Science Requirement<sup>2</sup>
- 17

**Senior Year****First Semester**

- 3 - PES 3500 Practicum
  - 2 - PES 4030 Soil Genesis and Classification
  - 1 - PES 4550 Seminar
  - 3 - Applied Spatial Technology Requirement<sup>3</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Field Scale Environmental Mgt. Requirement<sup>4</sup>
- 15

**Second Semester**

- 3 - PES (BE) 4080 Land Treatment of Wastewater and Sludges
  - 3 - PES 4900 Beneficial Soil Organisms in Plant Growth
  - 6 - Concentration Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15
- 123-124 Total Semester Hours

<sup>1</sup>Select from department-approved list. Courses to support proficiency in a foreign language also are encouraged.<sup>2</sup>See General Education Requirements.<sup>3</sup>AGM 4100, FOR 4330, GEOL 4210, or other course approved by advisor.<sup>4</sup>AGM 4020, GEOL 4090, or other course approved by advisor.**PREPROFESSIONAL HEALTH STUDIES****Non-degree**

The health professions need individuals with a diversity of educational backgrounds and a wide variety of talents and interests. The philosophies of education, the specific preprofessional course requirements, the noncognitive qualifications for enrollment, and the systems of training vary among the professional health schools; but all recognize the desirability of a broad education—a good foundation in the natural sciences, highly developed communication skills, and a solid background in the humanities and social sciences. The absolute requirements for admission to professional health schools are limited to allow latitude for developing individualized undergraduate programs of study; however, most schools of medicine and dentistry require 16 semester hours of chemistry, including organic chemistry, eight hours of biological sciences, eight hours of physics, and six hours of mathematics. These requirements should be balanced with courses in vocabulary building, the humanities, and social sciences. The basic requirements in the natural sciences and as many of the courses in the humanities and social sciences as possible should be completed by the third year so students are prepared to take the Dental Admission Test or the Medical College Admission Test prior to applying to a professional school.

Undergraduates may also prepare to study optometry, podiatry, and other health professions. While the basic requirements for these professional schools are essentially the same as those for schools of medicine and dentistry, specific requirements for individual schools in these professions vary somewhat; consequently, interested students are advised to consult with the chief health professionals advisor.

At Clemson, rather than having a separate, organized preprofessional health studies program, students are allowed to major in any curriculum, as long as the basic entrance requirements of the professional health school are fulfilled. These schools are not as concerned about a student's major as they are about academic performance in whichever curriculum the student chooses. Professional health schools have neither preferences nor prejudices concerning any curriculum, which is evidenced by the fact that their entering students represent a broad spectrum of curricula. The emphasis is placed on the student's doing well in the curriculum chosen, and this becomes critical as competition increases for the limited number of places available in professional health schools.

## PREPHARMACY

The two-year Prepharmacy program requires 66-72 credit hours, depending on the pharmacy school of interest. Upon completion of the program, students will be eligible to apply to a college of pharmacy, usually the South Carolina College of Pharmacy (MUSC and USC campuses), and may be eligible to apply for the Bachelor of Science in Preprofessional Studies. The degree in Pharmacy is awarded by the institution attended. It is important for students to work closely with their advisor as there are variations in courses required by the pharmacy schools.

For financial aid purposes, students in the Prepharmacy program are considered to be enrolled in a degree-seeking program.

### First Year

#### First Semester

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 4 - CH 1010 General Chemistry
- 4 - MATH 1060 Calculus of One Variable I
- 3 - PSYC 2010 Introduction to Psychology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>

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#### Second Semester

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 4 - CH 1020 General Chemistry
- 3 - ECON 2000 Economic Concepts
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 1 - Elective

18

### Second Year

#### First Semester

- 4 - BIOL 2220 Human Anatomy and Phys. I
- 3 - CH 2230 Organic Chemistry
- 1 - CH 2270 Organic Chemistry Lab.
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - History or Philosophy Requirement<sup>3</sup>

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### Second Semester

- 4 - BIOL 2230 Human Anatomy and Phys. II
- 3 - CH 2240 Organic Chemistry
- 1 - CH 2280 Organic Chemistry Lab.
- 3 - COMM 1500 Intro. to Human Comm. *or*
- 3 - COMM 2500 Public Speaking
- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 3 - Science and Tech. in Society Requirement<sup>4</sup>

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### Third Year<sup>5</sup>

72-90 Total Semester Hours

<sup>1</sup>AAH 2100 or MUSC 2100

<sup>2</sup>Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

<sup>3</sup>See advisor.

<sup>4</sup>See General Education Requirements.

<sup>5</sup>Students planning to receive the Bachelor of Science in Preprofessional Studies degree are required to complete a minimum of 18 additional credit hours which must include MICR 3050, and successfully complete a year at an accredited pharmacy school. See advisor for requirements.

## PREREHABILITATION SCIENCES

The Prerehabilitation Sciences major includes concentrations in physical therapy, occupational therapy, communication sciences and disorders, as well as in physician assisting and allied health areas. This curriculum is designed to meet the requirements of the programs in the College of Health Professions at the Medical University of South Carolina and other professional schools. The program requires a minimum of 90 semester hours of undergraduate coursework. In addition, students must apply to a professional school for acceptance into its program.

Because preparation for some of the concentrations, such as the physical therapy, occupational therapy, and communication sciences and disorders programs at MUSC, requires a baccalaureate degree in any area, students are advised to select a major with similar requirements after consultation with the Prerehabilitation Sciences advisor. The following curriculum fulfills the general requirements for those fields requiring less than a baccalaureate degree. Electives should be chosen after consultation with the advisor. Professional schools may change their requirements at any time, so it is imperative that students in this major stay in close contact with their advisor.

For financial aid purposes, students in the Prerehabilitation Sciences program are considered to be enrolled in a degree-seeking program.

### First Year

#### First Semester

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 4 - CH 1010 General Chemistry
- 3 - PSYC 2010 Introduction to Psychology
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Science and Technology in Society Req.<sup>1</sup>

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### Second Semester

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Lab. II
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 3 - SOC 2010 Introduction to Sociology
- 1 - Elective

18

### Second Year

#### First Semester

- 4 - BIOL 2220 Human Anatomy and Phys. I
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - PSYC 3400 Lifespan Developmental Psych.
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Arts and Humanities Requirement<sup>1</sup>

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#### Second Semester

- 4 - BIOL 2230 Human Anatomy and Phys. II
- 3 - COMM 1500 Intro. to Human Comm. *or*
- 3 - COMM 2500 Public Speaking
- 3 - CPSC 1200 Intro. to Information Technology
- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 3 - Mathematics Requirement<sup>3</sup>

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### Third Year<sup>4</sup>

90 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

<sup>3</sup>See advisor.

<sup>4</sup>Students planning to receive the Bachelor of Science degree must transfer to a degree-granting major. See advisor for requirements.

## PREVETERINARY MEDICINE

Under a regional plan, the South Carolina Preveterinary Advisory Committee coordinates a program for South Carolina residents who are interested in pursuing careers in veterinary medicine. South Carolina residents attending any college or university may apply through the Veterinary Medical College Application Service (VMCAS) to the University of Georgia College of Veterinary Medicine. Currently the University of Georgia admits up to 17 students each year through arrangements with the Southern Regional Education Board. The State of South Carolina has a contract with Mississippi State University to admit up to five South Carolina residents. The State of South Carolina also has a contract with Tuskegee University to admit up to four South Carolina residents. Application must be made directly to Tuskegee University.

Minimum requirements for admission to a college of veterinary medicine generally include the satisfactory completion of prescribed courses in a well-rounded undergraduate degree program. Specific requirements for admission to the University of Georgia College of Veterinary Medicine include the following undergraduate courses: six credits of English, 14 credits of humanities and social studies, eight credits of physics, eight credits of general biology, eight credits of

advanced biology, three credits of biochemistry, and 16 credits of organic and inorganic chemistry. (Chemistry and physics courses must be at the premedical level; they may not be survey courses.)

To be in the best competitive position, applicants should complete courses in animal agriculture, genetics, nutrition, biochemistry, and advanced biology. Considerations for selection are character, scholastic achievement, personality, experience with large and small animals, general knowledge, and motivation. In the past, competition has been keen, and only those applicants who have shown exceptional ability have been admitted. Specific considerations may include a minimal grade-point average and completion of standardized tests such as the Graduate Record Examination and the Veterinary College Admission Test.

Since out-of-state students attending Clemson are ineligible to apply to the University of Georgia or Tuskegee University under the South Carolina quota, they should contact the college(s) of veterinary medicine to which they plan to apply. They may apply at the University of Georgia for at-large admission.

Veterinary schools accept students with a broad range of academic backgrounds; therefore, it is recommended that the beginning university student select any undergraduate major and simultaneously complete the courses required for veterinary school entrance and those required for completion of a BS or BA degree. For students selecting Animal and Veterinary Sciences or Biological Sciences at Clemson University, the basic curricula have been designed to accommodate Georgia's entrance requirements. Further information is available from the Department of Animal and Veterinary Sciences at (864) 656-3427.

## TURFGRASS

### Bachelor of Science

Turfgrass is a major part of our built environment and daily life, including home lawns, sports fields, and golf courses. Grassed areas are aesthetically attractive and provide many environmental benefits, including the prevention of soil erosion, noise reduction, improved water quality, and reduced injuries from sports.

Graduates pursue careers in management of professional golf courses and sports fields and in lawn care; production and sale of seed, sod, supplies, and equipment; or as technicians for businesses or government agencies. The curriculum provides a strong foundation in science, advanced business, and environmental and leadership skills that are needed for success in today's competitive environment. Courses in horticulture also provide a background for turfgrass managers who may have responsibilities for landscaped areas.

Students work closely with faculty in creative inquiry groups to investigate and implement solutions to real problems. Student interns experience a wide range of turf facilities, businesses, and public institutions to develop skills and experience needed for successful careers. In addition, the University's golf course (Walker Golf Course) and athletic fields offer great employment and learning opportunities.

## Freshman Year

### First Semester

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab I
- 4 - CH 1010 General Chemistry
- 3 - HORT 1010 Horticulture
- 3 - MATH 1020 Intro to Math Analysis
- 3 - Arts and Humanities (Non-Lit) Requirement<sup>1</sup>

17

### Second Semester

- 3 - BIOL 1040 General Biology II
- 1 - BIOL 1060 General Biology Laboratory II
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - MATH 1010 Essential Math for Informed Soc.

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## Sophomore Year

### First Semester

- 3 - BIOL 3040 Biology of Plants
- 1 - BIOL 3080 Biology of Plants Lab
- 3 - HORT 2120 Introduction to Turfgrass Culture
- 1 - HORT 2130 Turfgrass Culture Lab.
- 3 - HORT 3030 Landscape Plants
- 3 - Social Science Requirement<sup>1</sup>

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### Second Semester

- 3 - HORT 4270 Urban Tree Care
- 4 - PES 2020 Soils
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Oral Communications Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>

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### Summer

- 3 - HORT 4710 Internship<sup>2</sup> or
- 3 - HORT 4710 Advanced Internship<sup>2</sup>

3

## Junior Year

### First Semester

- 4 - ENT 3010 Insect Biology and Diversity
- 3 - PES 3100 Plant Disease and People
- 3 - Business Requirement<sup>3</sup>
- 3 - Horticulture Specialization Requirement<sup>4</sup>
- 3 - Soil Science Requirement<sup>5</sup>

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### Second Semester

- 3 - AGM 4020 Landscape Drainage and Irrigation
- 3 - BIOL 4010 Plant Physiology
- 1 - BIOL 4020 Plant Physiology Lab.
- 3 - HORT 4200 Applied Turfgrass Physiology
- 2 - PLPA (ENT) 4060 Diseases and Insects of Turfgrasses
- 3 - Horticulture Specialization Requirement<sup>4</sup>

15

### Summer

- 1 - PLPA (ENT) 4080 Diseases and Insects of Turfgrasses Laboratory

## Senior Year

### First Semester

- 3 - HORT 4090 Senior Capstone Course
- 3 - HORT 4120 Advanced Turfgrass Management
- 3 - PES 4460 Soil Management
- 3 - Business Requirement<sup>3</sup>
- 3 - Related Science Requirement<sup>6</sup>

15

### Second Semester

- 3 - HORT (PES) 4330 Landscape and Turf Weed Management
- 3 - PES 4520 Soil Fertility
- 1 - PES 4530 Soil Fertility Lab
- 3 - Business Requirement<sup>3</sup>
- 6 - Related Science Requirement<sup>6</sup>

16

123 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements.

<sup>2</sup>Internship must be completed in one or two semesters. First internship must be completed within one year after successfully passing HORT 2120/2130. Prior approval is required for internships, and a GPA of 2.0 is required for registration. Students are strongly encouraged to take multiple internships.

<sup>3</sup>See advisor. Select from approved departmental list. A total of nine hours is required.

<sup>4</sup>Turfgrass majors are required to take six hours of HORT specialization courses. Turfgrass internship courses do not count as HORT specialization courses.

<sup>5</sup>In addition to PES 2020, 4460, 4520, and 4530, students must select one additional soils course from PES 4010, 4080 or 4900.

<sup>6</sup>Choose nine hours from the recommended list of courses.

\*Note: Turfgrass majors must earn a C or better in all HORT courses. Courses may be repeated as often as necessary to achieve the minimum grade.

## WILDLIFE AND FISHERIES BIOLOGY

### Bachelor of Science

Increased interest in conservation of natural resources and the environment and demand for seafood products has resulted in these areas becoming increasingly technical and requiring highly qualified wildlife and fisheries biologists. Greatest demands for graduates are in the areas of management, research, survey, and regulatory positions with state and federal agencies; industrial research and quality control laboratories; conservation, recreation, and other public service agencies; and private enterprises.

The Bachelor of Science degree program in Wildlife and Fisheries Biology provides a solid foundation for many careers in the sciences. The curriculum is strong in basic and applied sciences, communication skills, and the social sciences. In addition, three credit hours are available for field training with appropriate natural resource agencies. Students may satisfy coursework requirements for professional certification by the Wildlife Society and/or the American Fisheries Society.

For students interested in conservation biology, water, and natural resources, the School of Agricultural, Forest, and Environmental Sciences also administers the Conservation Biology and Natural Resources Management Concentrations within the Environmental and Natural Resources degree program. See pages 51-52 for program details.

### Combined Bachelor of Science/Master of Science Degree Program

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for the dual degree from the School of Agricultural, Forest, and Environmental Sciences as early as possible in their undergraduate program, as a number of required courses have prerequisites not normally taken by Wildlife and Fisheries Biology majors. Enrollment guidelines and procedures can be found under Academic Regulations in this catalog.

#### Freshman Year

##### First Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CH 1010 General Chemistry
  - 1 - ENR 1010 Intro. to Env. and Natural Res. I
  - 3 - MATH 1020 Intro. to Mathematical Analysis
  - 3 - Oral Communication Requirement<sup>1</sup>
- 
- 15

##### Second Semester

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab. II
  - 4 - CH 1020 General Chemistry *or*
  - 4 - PHYS 2000 Introductory Physics
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - STAT 2300 Statistical Methods I
  - 1 - FNR 1020 FNR Freshman Portfolio
- 
- 15

#### Sophomore Year

##### First Semester

- 4 - FNR 2040 Soil Information Systems
  - 2 - FOR 2050 Dendrology
  - 3 - FOR 2210 Forest Biology
  - 3 - WFB 3000 Wildlife Biology
  - 1 - WFB 3010 Wildlife Biology Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 
- 16

##### Second Semester

- 3 - ENGL 3140 Technical Writing
  - 3 - FOR 2060 Forestry Ecology
  - 3 - GEN 3000 Fundamental Genetics
  - 3 - WFB 3500 Principles of Fish and Wildlife Biol.
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 15

#### Junior Year

##### First Semester

- 3 - BIOL 3030 Vertebrate Biology
  - 4 - BIOL 3200 Field Botany
  - 3 - WFB 4100 Wildlife Management Techniques
  - 3 - WFB 4120 Wildlife Management
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 
- 16

#### Second Semester

- 3 - APEC 4750 Econ. of Wildlife Mgt. and Policy *or*
  - 3 - ENR 4500 Conservation Issues
  - 3 - WFB (BIOL) 3130 Conservation Biology
  - 3 - WFB 4160 Fishery Biology
  - 3 - WFB 4620 Wetland Wildlife Biology
  - 3 - Approved Requirement<sup>2</sup>
- 
- 15

#### Senior Year

##### First Semester

- 3 - APEC 2570 Natural Resources, Environment, and Economics
  - 4 - AVS 3010 Anat. and Phys. of Domestic Animals
  - 3 - FOR (ENR) 4340 GIS for Landscape Planning
  - 1 - WFB 4980 Senior Portfolio
  - 4 - Approved Requirement<sup>2</sup>
- 
- 15

##### Second Semester

- 1 - FNR 4990 Natural Resources Seminar
  - 3 - WFB 4300 Wildlife Conservation Policy
  - 8 - Approved Requirement<sup>2</sup>
  - 3 - Policy and Law Requirement<sup>2</sup>
- 
- 15

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society Requirements. (*Note:* Social Science Requirement must be in an area other than economics or applied economics.)

<sup>2</sup>Select from department-approved list.

2014-15

## MINORS

Following are minors acceptable for students in the College of Agriculture, Forestry and Life Sciences. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management Information Systems
Adult/Extension Education	Mathematical Sciences
Aerospace Studies	Microbiology
Agricultural Business Management	Military Leadership
Agricultural Mechanization and Business	Modern Languages
American Sign Language Studies	Music
Animal and Veterinary Sciences	Natural Resource Economics
Anthropology	Nonprofit Leadership
Architecture	Packaging Science
Art	Pan African Studies
Athletic Leadership	Park and Protected Area Management
Biochemistry	Philosophy
Biological Sciences	Physics
Business Administration	Plant Pathology
Chemistry	Political Science
Cluster	Psychology
Communication Studies	Public Policy
Computer Science	Recreational Therapy
Crop and Soil Environmental Science	Religion
Digital Production Arts	Russian Area Studies
East Asian Studies	Science and Technology in Society
Economics	Screenwriting
Education	Sociology
English	Spanish-American Area Studies
Entomology	Sustainability
Entrepreneurship	Theatre
Environmental Science and Policy	Travel and Tourism
Equine Industry— <i>not open to Animal and Veterinary Sciences majors</i>	Turfgrass— <i>not open to Horticulture majors</i>
Film Studies	Urban Forestry
Financial Management	Wildlife and Fisheries Biology
Food Science	Women's Studies
Forest Products— <i>not open to Forestry majors</i>	Writing
Forest Resource Management	
Genetics	
Geography	
Geology	
Global Politics	
Great Works	
History	
Horticulture— <i>not open to Turfgrass majors</i>	
Human Resource Management	
Legal Studies	
Management	

See pages 39-42 for details.

## COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

By uniting the humanities with the disciplines of design and building and the arts, the College of Architecture, Arts and Humanities offers one-of-a-kind opportunities for interdisciplinary exploration and achievement—opportunities that are at once rigorous and imaginative, classical and innovative. Students and faculty see their ideas expressed in a myriad of forms—as buildings and landscapes, as the written word, as music and drama, as paintings, pots, prints and photographs. They work in the very oldest media and the very newest. They work alone. They work together. They seek not only the imaginative answers, but the enduring questions.

The College of Architecture, Arts and Humanities is organized into three schools. The School of the Arts includes the departments of Art and Performing Arts. The School of Design and Building includes the School of Architecture, the Department of Construction Science and Management, and the Department of Planning and Landscape Architecture. The School of the Humanities includes the departments of Communication Studies; English; History; Languages; and Philosophy and Religion. In addition to the undergraduate and graduate degrees offered by the ten departments, an array of interdisciplinary programs is housed in the Office of the Dean, including the doctoral programs in Planning, Design and the Built Environment; and in Rhetoric, Communication and Information Design.

### SCHOOL OF DESIGN AND BUILDING AND SCHOOL OF THE ARTS

The Bachelor of Arts in Architecture degree is the preprofessional preparation for graduate study leading to the Master of Architecture degree, which is the fully accredited professional degree in the field. The accredited Bachelor of Science in Construction Science and Management program prepares students for careers as professional managers in the construction industry. A graduate program is also offered leading to the Master of Construction Science and Management. The Visual Arts program offers professional study in the studio visual arts leading to the Bachelor of Fine Arts degree. A graduate program leading to the Master of Fine Arts is also offered. The accredited five-year Bachelor of Landscape Architecture degree program prepares students for careers as professional landscape architects. The Bachelor of Arts in Production Studies in Performing Arts is a distinctive degree program that combines practical hands-on experiences in performing arts production technologies with classes in music and theatre performance, history, and theory. A graduate program in City and Regional Planning is housed within the school and accepts graduates from a variety of baccalaureate programs and prepares them for careers in both public and private sector planning through its Master of City and Regional Planning degree. The Master of Science in Historic Preservation degree is a professional degree program designed for

students who will specialize in working with historic buildings, landscapes, and the decorative arts. The Master of Real Estate Development is a full-time, two-year professional degree jointly offered by the Department of Planning and Landscape Architecture and the Department of Finance in the College of Business and Behavioral Science.

In addition to the facilities housed on the Clemson campus, the College offers third- and fourth-year Architecture and fourth-year Landscape Architecture students the opportunity to earn credit toward their degrees at three off-campus sites. Students may spend a semester at the Charleston Architecture Center earning credit from both Clemson University and the College of Charleston. Additionally, the Charles E. Daniel Center for Building Research and Urban Studies in Genoa, Italy, and the Barcelona Program in Barcelona, Spain, provide students with an intensive program of study and travel in Europe.

#### Architecture Charleston Program

Located in Charleston, South Carolina, this program is available to qualified undergraduates in Architecture, Construction Science and Management, Landscape Architecture, and Visual Arts. Studio work is oriented toward design within the historic seaport setting. Students also enroll in classes at the College of Charleston campus. The program is enriched by visiting scholars and professionals from the area.

#### Architecture Overseas Program

The Daniel Center for Building Research and Urban Studies in Genoa, Italy, is available to qualified Bachelor of Arts in Architecture, Master of Architecture, Construction Science and Management, Fine Arts, City and Regional Planning, and professional year Landscape Architecture students. The Barcelona program in Barcelona, Spain, is available to qualified Bachelor of Arts in Architecture and professional year Landscape Architecture students. In both Genoa and Barcelona, studio and classroom work is enriched by visiting scholars and complemented by scheduled field trips in the country of program origin and in continental Europe.

#### Entrance Requirements

Admission to degree programs in the School of Design and Building and the School of the Arts is based on academic performance and is limited based on space availability in the various programs. Students seeking admission are advised to apply to the Admissions Office early in the fall of their senior year in high school. They are also encouraged to visit the school during their senior year. Faculty are available to meet with them and their parents informally and answer questions and discuss individual programs in more detail. Prospective students may schedule appointments by calling the individual department.

#### Advancement in Architecture

Students enrolled in second-, third-, or fourth-year design studios and theory courses must attain at least a 2.0 grade-point average in each year level (by repeating one or both semesters, if necessary) to qualify for advancement to the next year level or, in the case of fourth-year Architecture studios, to qualify for the Architecture degree, or in Landscape Architecture at the fifth year, to qualify for the Bachelor of Landscape Architecture degree.

## SCHOOL OF HUMANITIES

The Bachelor of Arts degree is offered in Communication Studies, English, History, Language and International Trade, Modern Languages, Pan African Studies, Philosophy, Religious Studies, Sports Communication, and Women's Leadership. The Bachelor of Science degree is offered in Language and International Health.

To achieve depth as well as breadth in their education experiences, students majoring in Communication Studies, English, History, Modern Languages, Pan African Studies, Philosophy, Religious Studies, Sports Communication, or Women's Leadership complete at least 24 semester hours from courses above the sophomore level. As soon as feasible and not later than the end of the sophomore year, students in these fields also select a minor consisting of at least 15 additional semester hours. Courses satisfying the major may not also be included in the minor. A second major (a double major) may substitute for the minor, provided all requirements are fulfilled for each major.

The foreign language requirement is a proficiency requirement. Students must complete through 2020 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish. Some majors allow American Sign Language to fulfill the foreign language requirement.

Students enrolled in degree programs offered in the humanities who expect to teach in the public schools may elect education courses required for teaching certificates by the South Carolina Department of Education. Such courses are to be approved by their own department advisors.

Students may transfer into the Undeclared category in the humanities only if they have completed 45 or fewer credit hours. For more information, contact the College of Architecture, Arts and Humanities Advisement Center in 101 Strode Tower.

## ARCHITECTURE

### Bachelor of Arts

The Bachelor of Arts in Architecture prepares students for subsequent professional education by providing a sound general education, focused design studies, complementary support courses, and the requirement to study in an off campus location. The School of Architecture emphasizes the relationship of buildings to the rest of the environment: built, natural, and cultural. The curriculum includes seven semesters of studio in addition to complementary courses in architectural history and theory and building technology. The first three studios are collaborative, taught by faculty in Architecture, and Communication Studies. The Bachelor of Arts also includes requirements for a minor and foreign language.

In the first two years of the program, students learn to apply the thinking and communications skills needed to pursue higher-level work in the discipline. The curriculum in the first two years also allows students to complete most of the University's general education requirements. In the junior year, students must select an off-campus, location-specific studio and co-required coursework in order to fulfill their off-campus study requirement. The final studio focuses on reflection and synthesis.



## Accreditation and Registration

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Doctor of Architecture and Master of Architecture degree programs may consist of a pre-professional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the pre-professional degree is not, by itself, recognized as an accredited degree.

Clemson University, College of Architecture, Arts and Humanities, School of Architecture offers the following NAAB-accredited degree programs:

M.Arch. (pre-professional degree + 60 graduate credits)

M.Arch. (pre-professional degree + 61 credits)  
Architecture + Health

M.Arch. (non-pre-professional degree + 90 credits)

M.Arch. (non-pre-professional degree + 91 credits)  
Architecture + Health

The next accreditation visit for all programs will be in 2017.

## Freshman Year

### First Semester

3 - AAH 1010 Survey of Art and Arch. History I  
3 - ARCH 1010 Introduction to Architecture  
3 - ENGL 1030 Accelerated Composition  
4 - MATH 1060 Calculus of One Variable I  
3 - PHYS 2070 General Physics I  
1 - PHYS 2090 General Physics I Lab.  
17

### Second Semester

3 - AAH 1020 Survey of Art and Arch. History II  
5 - ARCH 1510 Architecture Communication  
3 - BIOL 2040 Environment, Energy and Society  
4 - Foreign Language Requirement<sup>1</sup>  
15

## Sophomore Year

### First Semester

3 - ARCH 2040 History and Theory of Mod. Arch  
6 - ARCH 2510 Architecture Foundations I  
3 - ENGL 2120 World Literature  
3 - Foreign Language Requirement<sup>1</sup>  
15

### Second Semester

6 - ARCH 2520 Architecture Foundations II  
3 - ARCH 2700 Structures I  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>2</sup>  
15

## Junior Year

### First Semester

3 - Architecture History/Theory Requirement<sup>3</sup>  
3 - Building Technology Requirement<sup>4</sup>  
6 - Studio Requirement<sup>5</sup>  
3 - Elective  
15

### Second Semester

3 - ARCH 4010 Architectural Portfolio  
6 - Minor Requirement<sup>6</sup>  
6 - Studio Requirement<sup>5</sup>  
15

## Senior Year

### First Semester

6 - Minor Requirement<sup>6</sup>  
3 - Social Science Requirement<sup>2</sup>  
6 - Studio Requirement<sup>5</sup>  
15

### Second Semester

6 - ARCH 4520 Synthesis Studio  
3 - Minor Requirement<sup>6</sup>  
6 - Elective  
15

122 Total Semester Hours

<sup>1</sup>Three semesters (through 2020) in the same foreign language are required.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>3</sup>ARCH 4030, 4040, 4050, 4120, or 4710

<sup>4</sup>ARCH 2710, 4140, 4160, 4210, 4770, CSM 2020, 2030, 2050, 3040, or 3050

<sup>5</sup>ARCH 3510, 3520, 3530, 3540 or 3550

<sup>6</sup>See advisor.

## COMMUNICATION STUDIES

### Bachelor of Arts

The Bachelor of Arts in Communication Studies provides a thoroughly integrated yet individual degree program that prepares students for careers in business, government, and public sectors. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in the humanities, social sciences, business, and law. Through their coursework and extracurricular experiences, Communication Studies majors develop a set of skills in oral, written, and visual communication that enables them to research, design, present, and evaluate messages across diverse contexts and from a variety of platforms, including digital communication technology.

Students may change majors into the Communication Studies program based on approval of a committee of faculty from the Department of Communication Studies. The deadline for applying for a change of major during the fall semester is September 15, with decisions made by October 1. For spring semester changes of major, the deadline is February 15, with decisions made by March 1. The Department of Communication Studies accepts a maximum of 30 changes of major per year. To qualify for acceptance, applicants should have completed 15 credit hours including ENGL 1030 and COMM 2010 (with a

C or better). All students requesting a transfer into the Communication Studies program must have a grade-point average of 2.5 or higher. An application form and a writing sample are also required. Detailed information is available from the Communication Studies Department, 408 Strode Tower or the department Web site: [www.clemson.edu/caah/communication](http://www.clemson.edu/caah/communication).

## Freshman Year

### First Semester

1 - COMM 1010 Communication Academic and Professional Development I  
3 - ENGL 1030 Accelerated Composition  
4 - Foreign Language Requirement<sup>1</sup>  
3 - Mathematics Requirement<sup>2</sup>  
3 - Social Science Requirement<sup>3</sup>  
14

### Second Semester

4 - COMM 2010 Intro. to Communication Studies  
3 - COMM 2500 Public Speaking  
4 - Foreign Language Requirement<sup>1</sup>  
3 - Mathematics or Natural Science Requirement<sup>3</sup>  
3 - Elective  
17

## Sophomore Year

### First Semester

3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>  
3 - Emphasis Area Requirement<sup>4</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>3</sup>  
3 - Social Science Requirement<sup>3</sup>  
16

### Second Semester

3 - COMM 3010 Communication Theory *or*  
3 - COMM 3020 Mass Comm. Theory *or*  
3 - COMM 3150 Critical Discourse Theory  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
6 - Elective  
15

## Junior Year

### First Semester

3 - Communication Requirement<sup>5</sup>  
3 - Emphasis Area Requirement<sup>4</sup>  
3 - Minor Requirement  
6 - Elective  
15

### Second Semester

3 - COMM 3060 Discourse, Criticism and Soc. *or*  
3 - COMM 3100 Quantitative Research Methods in Communication Studies *or*  
3 - COMM 3110 Qualitative Research Methods in Communication Studies  
3 - Communication Requirement<sup>5</sup>  
6 - Minor Requirement  
3 - Elective  
15

## Senior Year

### First Semester

6 - Emphasis Area Requirement<sup>4</sup>  
3 - Minor Requirement  
6 - Elective  
15

**Second Semester**

- 3 - COMM 4950 Senior Capstone Seminar
- 1 - COMM 4980 Communication Academic and Professional Development II
- 3 - Minor Requirement
- 6 - Elective
- 13

120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>STAT 2220 or 2300

<sup>3</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness Requirement and, if STAT 2220 is not selected, the Science and Technology in Society Requirement.

<sup>4</sup>See advisor. Emphasis area consists of 12 credit hours of COMM coursework at the 3000-4000 level with a single theme.

<sup>5</sup>Select from 3000-4000-level COMM courses.

## CONSTRUCTION SCIENCE AND MANAGEMENT

**Bachelor of Science**

As the largest single industry in the United States and one of the most important, construction offers unlimited opportunities to highly motivated and professionally educated men and women. Future professionals must be skilled in managing people, equipment, and capital, in addition to having a thorough knowledge of construction materials and methods and the complex technologies of modern construction. The Bachelor of Science in Construction Science and Management curriculum is the basis for a career in construction or as a developer or building management specialist.

Change of major requests are considered only once a year, in late May or early June. Students who wish to change their major to Construction Science and Management must have completed at least 30 credit hours (with a minimum of 24 credit hours taken at Clemson University) with a minimum grade-point average of 2.7; and must have successfully completed ENGL 1030, PHYS 2070/2090, and the mathematics requirement (MATH 1020 or 1060) by the end of the spring semester of the year the change-of-major request is made. Students should contact the Construction Science and Management Department, 122 Lee Hall. The Department's Faculty Admissions Committee will consider all requests in late May or early June and select the top students by cumulative grade-point average based on space availability. Students who do not meet the minimum requirements at the end of spring semester will not be considered.

**Freshman Year****First Semester**

- 3 - CSM 1000 Intro. to Construction Sci. and Mgt.
- 3 - ENGL 1030 Accelerated Composition
- 3 - MGT 2180 Management Personal Computer Applications
- 4 - MATH 1060 Calculus of One Variable I<sup>1</sup>
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 17

**Second Semester**

- 3 - AAH 2100 Introduction to Art and Architecture
- 3 - CSM 1500 Construction Problem Solving
- 3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking
- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 3 - STAT 3090 Introductory Business Statistics
- 16

**Sophomore Year****First Semester**

- 3 - AGM 2210 Surveying
- 3 - CSM 2010 Structures I
- 3 - CSM 2030 Materials and Methods of Const. I
- 3 - ECON 2110 Principles of Microeconomics
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
- 4 - CSM 2020 Structures II
- 3 - CSM 2040 Contract Documents
- 3 - CSM 2050 Materials and Methods of Const. II
- 3 - ECON 2120 Principles of Macroeconomics
- 16

**Junior Year****First Semester**

- 3 - CSM 3030 Soils and Foundations
- 3 - CSM 3040 Environmental Systems I
- 3 - CSM 3510 Construction Estimating
- 3 - ENGL 3040 Business Writing or  
3 - ENGL 3140 Technical Writing
- 3 - Social Science Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - CSM 3050 Environmental Systems II
- 3 - CSM 3520 Construction Scheduling
- 3 - CSM 3530 Construction Estimating II
- 3 - LAW 3220 Legal Environment of Business
- 3 - MGT 3070 Human Resource Management
- 15

**Senior Year****First Semester**

- 3 - CSM 4110 Safety in Building Construction
- 1 - CSM 4500 Construction Internship
- 3 - CSM 4530 Construction Project Management
- 3 - CSM 4610 Construction Economics Seminar
- 6 - Major Requirement<sup>3</sup>
- 16

**Second Semester**

- 6 - CSM 4540 Construction Capstone
- 6 - Major Requirement<sup>3</sup>
- 3 - Science and Tech. in Society Requirement<sup>2</sup>
- 15

125 Total Semester Hours

<sup>1</sup>A sequence of MATH 1020 and 2070 and may be substituted.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>Select from department-approved list or as approved in writing by advisor and department chair. Note: Six credit hours must be in business.

Note: A minimum of 800 hours of construction experience will be required prior to graduation.

**ENGLISH****Bachelor of Arts**

The core courses of the English major help students acquire an understanding of literature as a humanistic study; develop an appreciation and practical knowledge of the modes of literary expression, research, and criticism; and improve the ability to communicate effectively and intelligently.

By the end of the sophomore year, students choose between two emphasis areas: Literature or Writing and Publication Studies. The Literature Emphasis Area offers an extensive exploration of American and British literature, literary theory, and related disciplines such as creative writing and film. The Writing and Publication Studies Emphasis Area focuses on digital publishing, professional communication, rhetoric, creative writing, and writing about the arts. By teaching students to read closely, think critically, and communicate effectively, both emphasis areas prepare English majors for work in a variety of professional and academic fields.

The standard program of study consists of courses stipulated in the map below, which includes 24 credit hours of core courses and 15 hours chosen from one of the two emphasis areas.

**Core Courses**

ENGL 3000 and 3100 and 18 additional credits selected from the following:

**Literature Survey Requirement**—Six credit hours from ENGL 3960, 3970, 3980, 3990

**Shakespeare**—ENGL 4110

**Language, Criticism, and Theory**—Three credits from ENGL 4000, 4010, 4350, (WS) 4360, 4400, 4420, (COMM) 4910, (COMM) 4920

**Advanced Writing**—Three credits selected from ENGL 3040, 3120, 3140, 3150, 3450, 3460, (THEA) 3470

**Major Electives**—Three credits from 3000- or 4000-level ENGL courses

**Capstone Seminar**—ENGL 4960

**Literature Emphasis Area**

**Literature I (to 1699)**—Three credits from ENGL 4030, 4070, 4080, 4100, 4140, 4200, (THEA) 4290, 4440, 4630

**Literature II (1700–1899)**—Three credits from ENGL 4150, 4160, 4170, 4180, 4210, 4250, 4260, 4640

**Literature III (from 1900)**—Three credits from ENGL 4280, (THEA) 4300, 4310, 4320, 4330, 4340, 4550, 4650

**Diversity**—Three credits from ENGL 3530, 3800, 4190, (HUM) 4560, 4820, 4830

**Major Electives**—Three additional credits from 3000- or 4000-level ENGL courses

**Writing and Publication Studies****Emphasis Area**

ENGL 4990 plus 12 additional credits selected from the following:

**Language, Criticism, and Theory**—Three credits in addition to core requirements from ENGL 4000, 4010, 4350, (WS) 4360, 4400, 4420, (COMM) 4910, (COMM) 4920

**Advanced Writing**—Three credits, in addition to the Core Advanced Writing Requirement, selected from ENGL 3040, 3120, 3140, 3150, 3450, 3460, (THEA) 3470, 4450, 4460, (THEA) 4470, 4480, 4900

**WPS Courses**—Six credits from ENGL 3320, 3870, 4410, 4600, 4750, 4780, 4890, 4950

## Freshman Year

### First Semester

3 - ENGL 1030 Accelerated Composition  
3 - HIST 1720 The West and the World I  
4 - Foreign Language Requirement<sup>1</sup>  
3 - Mathematics Requirement<sup>2</sup>  
3 - Mathematics or Natural Science Requirement<sup>2</sup>  

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### Second Semester

3 - ENGL 2120 World Literature  
2 - ENGL 3000 Professional Development  
3 - HIST 1730 The West and the World II  
4 - Foreign Language Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>2</sup>  

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## Sophomore Year

### First Semester

3 - ENGL 3100 Critical Writing About Literature  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>  
3 - English Literature Survey Requirement<sup>4</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Elective  

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15

### Second Semester

3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking  
3 - English Literature Survey Requirement<sup>4</sup>  
3 - Fine Arts Requirement<sup>5</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
3 - History/Philosophy Requirement<sup>6</sup>  

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15

## Junior Year

### First Semester

6 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
3 - Science and Tech. in Society Requirement<sup>2</sup>  
3 - Social Science Requirement<sup>8</sup>  

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15

### Second Semester

6 - Major Requirement<sup>7</sup>  
6 - Minor Requirement  
4 - Elective  

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16

## Senior Year

### First Semester

9 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
3 - Elective  

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15

### Second Semester

3 - ENGL 4960 Senior Seminar  
6 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  

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12

120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>See General Education Requirements. Select from courses in philosophy.

<sup>4</sup>ENGL 3960, 3970, 3980, or 3990

<sup>5</sup>AAH 1010, 2100, ENGL 3570, HUM 3010, 3020, 3060, MUSC 2100, 3110, 4150, 4160, or THEA 2100

<sup>6</sup>Any 3000- or 4000-level HIST or PHIL course

<sup>7</sup>See major requirements in program description above.

<sup>8</sup>See General Education Requirements. Must be in an area other than history.

## HISTORY

### Bachelor of Arts

The History major provides students with flexibility to pursue their particular interests in history. The major includes 34 credit hours in history, in addition to HIST 1720 and 1730, as outlined below.

*History Major*—HIST 2990, 4900 or 4980 and 27 additional credits in History. Students must take three hours each of United States history, European history and non-Western history, in addition to three hours of history at the 4000 level. No more than six hours of 1000- and 2000-level history courses (in addition to HIST 2990) may be counted towards the Major Requirements.

*History Major (Public History Emphasis Area)*—HIST 2990; HIST 4900 or HIST 4980; HIST 4140; HIST 4800; HIST 2020; GEOG 4400; HIST 4150, 4170, 4180 or another course approved by the emphasis area coordinator; and 12 additional credits in History. Students must take three hours each of United States history, European history, and non-Western history, in addition to three hours of history at the 4000 level. No more than six hours of 1000- and 2000-level history courses (in addition to HIST 2020 and 2990) may be counted towards the Major Requirements.

Pre-law students majoring in History should consult the pre-law advisor for a recommended program.

Students who change majors into History must have completed at least 12 credit hours at Clemson and have either a minimum 2.0 cumulative grade-point average or have earned a B or better in HIST 1720 or 1730, taken at Clemson.

### Double Major in History/Secondary Education—Social Studies (History)

The Bachelor of Arts Degree in History and Secondary Education—Social Studies (History) prepares students for teaching at the secondary school level and for graduate studies in History. See page 119 for the curriculum.

## Freshman Year

### First Semester

3 - ENGL 1030 Accelerated Composition  
3 - HIST 1720 The West and the World I  
4 - Foreign Language Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>2</sup>  
2 - Elective  

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16

## Second Semester

3 - HIST 1730 The West and the World II  
4 - Foreign Language Requirement<sup>1</sup>  
3 - Geography Requirement<sup>3</sup>  
3 - Mathematics Requirement<sup>2</sup>  
3 - Mathematics or Natural Science Requirement<sup>2</sup>  

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16

## Sophomore Year

### First Semester

3 - Arts and Humanities (Literature) Requirement<sup>2</sup>  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Major Requirement<sup>4</sup>  
3 - Elective  

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15

### Second Semester

4 - HIST 2990 Seminar: The Historian's Craft  
3 - Advanced Humanities Requirement<sup>5</sup>  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  

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16

## Junior Year

### First Semester

3 - Advanced Humanities Requirement<sup>5</sup>  
6 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  
3 - Elective  

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15

### Second Semester

3 - Literature Requirement<sup>6</sup>  
6 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  
3 - Elective  

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15

## Senior Year

### First Semester

3 - 4000-Level History Requirement<sup>4</sup>  
3 - Advanced Humanities Requirement<sup>5</sup>  
3 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  
3 - Elective  

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15

### Second Semester

3 - HIST 4900 Senior Seminar or  
3 - HIST 4980 Senior Honors Thesis  
3 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  
3 - Elective  

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12

120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>3</sup>GEOG 1010, 1030, or 1060

<sup>4</sup>See advisor. Students must take three hours each of U.S. history, European history, and non-Western history, in addition to three hours of history at the 4000 level. No more than six hours of 1000- and 2000-level history courses (in addition to HIST 2990 [or HIST 2020] and 2990 for students in the Public History Emphasis Area) may be counted towards the Major Requirements.

<sup>5</sup>AAH 2100, MUSC 2100, THEA 2100, or any humanities course numbered 3000 or higher. The humanities for this purpose include AAH, COMM (except 3640, 3680), ENGL (except 3040, 3120, 3140, 3160, 3330, 3340, 3350, 4850, 4900, 4950), HUM, MUSC, PHIL, REL, THEA (except 3770, 4870, 4970), WS, and foreign language courses.

<sup>6</sup>Select from General Education Arts and Humanities (Literature) courses.

## LANDSCAPE ARCHITECTURE

### Bachelor of Landscape Architecture

The profession of landscape architecture is broad and interdisciplinary. Practicing landscape architects work on a wide range of project types, including, but not limited to, urban design, community design, historic preservation, ecological restoration, parks and park systems, institutional landscapes, memorials, cemeteries, industrial site reclamations, golf courses, wilderness areas and trails, residential landscapes, and gardens.

The profession is both an art and a science. Successful landscape architects are creative professionals who hold an environmental imperative and a social conscience. They are also excellent facilitators, able to bring numerous disciplines and professions together to work on complex projects in the landscape. Landscape Architecture students gain an understanding of this diverse range of subjects by participating in Clemson University's Creative Inquiry Initiative. As a consequence of numerous creative inquiry experiences within the program, students develop greater skills in teamwork, creative thinking, problem solving, and communication.

Clemson's Landscape Architecture program is noted for a special emphasis on the art of design. Consequently, the landscape architecture design studio experience is at the center of the student's education—42 hours of studio are required. The program leads to a nationally accredited Bachelor of Landscape Architecture degree. The program is generalist, covering the major areas of practice and building from design basics to sophisticated studio experiences, such as large scale landscape planning; parks, recreation, and open space planning; and regional, urban, and community design. The studio experience is supported by other courses inside and outside the Landscape Architecture curriculum that provide the necessary grounding in landscape history and social, cultural, environmental, and aesthetic theories. Students may also choose to focus elective credits on one of three areas: cultural issues, environmental issues, or professional development. Outstanding final year students may apply for admission into a shortened Master of City and Regional Planning, Master of Landscape Architecture, or Master of Real Estate Development program.

Any undergraduate student who meets the Academic Eligibility Policy after attempting 12 credit hours at Clemson University (or who is allowed to continue by virtue of a semester 2.4 grade-point average on 12 earned credits or who is allowed to continue through appeal to the Appeals Committee on Academic Eligibility or by other authorization of this committee) may transfer from one major to another. Any college or department that seeks an exception to this policy must have the approval of the collegiate dean and the provost.

### Freshman Year

#### First Semester

- 3 - AAH 2100 Intro. to Art and Architecture
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - LARC 1150 Intro. to Landscape Architecture
  - 3 - LARC 1280 Technical Graphics
  - 3 - LARC 1510 Basic Design I
- 15

#### Second Semester

- 3 - LARC 1160 History of Landscape Arch.
  - 6 - LARC 1520 Basic Design II
  - 3 - LARC 4280 Landscape Architecture Computer-Aided Design
  - 3 - MATH 1020 Intro. to Mathematical Analysis
- 15

### Sophomore Year

#### First Semester

- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 6 - LARC 2510 Landscape Architecture Design Fundamentals
  - 3 - LARC 2620 Design Implementation I
  - 3 - LARC 4380 Advanced Computer-Aided Design
- 15

#### Second Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology I Lab.
  - 6 - LARC 3520 Urban Design Studio
  - 3 - LARC 3620 Design Implementation II
  - 3 - Social Science Requirement<sup>1</sup>
- 16

### Junior Year

#### First Semester

- 6 - LARC 4510 Community Design Studio
  - 3 - LARC 4530 Key Issues in Landscape Arch.
  - 3 - LARC 4620 Landscape Architecture Technology III
  - 3 - Mathematics or Natural Science Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 18

#### Second Semester

- 3 - LARC 4190 Off Campus Field Studies
  - 3 - LARC 4210 Landscape Architectural Seminar
  - 6 - LARC 4520 Off Campus Studio
  - 3 - Elective
- 15

### Senior Year

#### First Semester

- 3 - FOR (HORT) 4270 Urban Tree Care
  - 6 - LARC 3510 Regional Design and Ecology
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Elective
- 15

#### Second Semester

- 6 - LARC 5520 Landscape Architecture Exit Project
  - 3 - LARC 5910 Professional Practice
  - 3 - Cross-Cultural Awareness Requirement<sup>1</sup>
  - 3 - Elective
- 15

124 Total Semester Hours

<sup>1</sup>See General Education Requirements.

## LANGUAGE AND INTERNATIONAL HEALTH

### Bachelor of Science

The Bachelor of Science program in Language and International Health is jointly administered by the Department of Languages and the Department of Public Health Sciences in the College of Health, Education and Human Development. Students acquire knowledge in public health theory and practice, including the history and philosophy of public health and medicine; the organization, management, and financing of health services; the social and behavioral aspects of health, epidemiology, health evaluation methods, and health communications. Students also acquire communicative competence in the target language and its culture, literatures, health environments, and multicultural issues.

The program requires the completion of a semester internship abroad. Graduates will be qualified to assume positions in a variety of settings, including integrated hospital systems, consulting firms, managed care organizations, pharmaceutical companies, as well as multicultural community centers. They can also pursue graduate degrees in community health, epidemiology/biostatistics, health administration, health systems and research.

In addition to the curriculum requirements below, students in the Language and International Health program will be required to pass a noncredit examination and submit a noncredit senior dossier to assess their language competence in various areas. Both assessments take place in the student's last full semester at the University.

Students who have completed fewer than 50 credit hours may change majors into Language and International Health with a minimum cumulative grade-point average of 2.5. Students with 50 or more credit hours may apply for a change of major into Language and International Health, based on space availability, with a minimum cumulative grade-point average of 2.75.

### Freshman Year

#### First Semester

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 4 - CHIN 1010 Elementary Chinese or
  - 4 - SPAN 1020 Elementary Spanish or
  - 4 - SPAN 1040 Basic Spanish
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - HLTH 2020 Introduction to Public Health
  - 1 - LIH 1270 Introduction to LIH
- 15

#### Second Semester

- 4 - CHIN 1020 Elementary Chinese or
  - 3 - SPAN 2010 Intermediate Spanish
  - 3 - HLTH 2980 Human Health and Disease
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Emphasis Area Requirement<sup>1</sup>
  - 3 - Elective
- 15-16

**Sophomore Year****First Semester**

- 4 - CH 1010 General Chemistry *or*  
4 - CH 1050 Chemistry in Context I  
3 - CHIN 2010 Intermediate Chinese *or*  
3 - SPAN 2020 Intermediate Spanish  
3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking  
3 - HLTH 4700 International Health  
3 - Social Science Requirement<sup>2</sup>
- 
- 16

**Second Semester**

- 4 - CH 1020 General Chemistry *or*  
4 - CH 1060 Chemistry in Context II  
3 - CHIN 2020 Intermediate Chinese *or*  
3 - SPAN 3020 Inter. Span. Grammar and Comp. *or*  
3 - SPAN 3050 Inter. Span. Conv. and Comp. I, *or*  
3 - SPAN 3060 Span Comp. for Business  
3 - HLTH 2400 Determinants of Health Behavior  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>  
3 - Emphasis Area Requirement<sup>1</sup>
- 
- 16

**Junior Year****First Semester**

- 4 - BIOL 2220 Human Anatomy and Phys. I  
3 - CHIN 3050 Chinese Conversation and  
Composition *or*  
3 - SPAN 4150 Spanish for Health Professionals  
3 - CHIN 4010 Premodern Chinese Literature *or*  
3 - SPAN 3040 Int. to Hisp. Literary Forms *or*  
3 - SPAN 3110 Survey of Spanish-Amer. Lit. *or*  
3 - SPAN 3130 Survey of Spanish Lit. I  
3 - HLTH 3800 Epidemiology  
3 - HLTH 4800 Community Health Promotion *or*  
3 - HEHD 4100 Leadership Behavior and Civic  
Engagement *or*  
3 - RS (SOC) 4590 The Community *or*  
3 - SOC 3310 Urban Sociology
- 
- 16

**Second Semester**

- 3 - CHIN 3060 Chinese Conversation and  
Composition *or*  
3 - SPAN 3070 The Hispanic World: Spain *or*  
3 - SPAN 3080 The Hispanic World: Latin  
America *or*  
3 - SPAN 3180 Spanish Through Culture *or*  
3 - SPAN 4350 Contemporary Hispanic  
Culture  
3 - CHIN (ANTH) 4180 Chinese Culture and  
Society *or*  
3 - SPAN 4180 Technical Spanish for Health  
Management Professionals  
3 - HLTH 4900 Research and Evaluation Strategies  
for Public Health  
3 - LIH 4000 Internship Abroad<sup>4</sup>  
3 - Advanced Chinese Requirement<sup>5</sup> *or*  
3 - Advanced Spanish Requirement<sup>3</sup> *or*  
3 - Advanced Health Requirement<sup>6</sup>
- 
- 15

**Senior Year****First Semester**

- 4 - BIOL 2230 Human Anatomy and Physiology II  
3 - CHIN 3170 Chinese for Health Professionals I *or*  
3 - SPAN 4190 Health and the Hispanic  
Community  
3 - HLTH 2030 Overview of Health Care  
3 - Emphasis Area Requirement<sup>1</sup>  
3 - Elective
- 
- 16

**Second Semester**

- 3 - CHIN 4170 Chinese for Health Professionals II *or*  
3 - Advanced Spanish Requirement<sup>5</sup>  
3 - Advanced Health Requirement<sup>6</sup>  
3 - Emphasis Area Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>2</sup>
- 
- 12

**121-122 Total Semester Hours**

<sup>1</sup>Select one of the following emphasis areas:

*Health Administration*—select one course from four of the following groups:

- Accounting—ACCT 2010  
Economics—ECON 2110, 2120  
Finance—FIN 3060  
Health—APEC (HLTH) 3610, HLTH 4750

*International Trade*—CHIN 3160, 4160, SPAN 3160, 4050, 4160, 4170

*Law*—LAW 3220

*Management*—MGT 2010, 2180, 3900, 4110, 4160, 4220, 4230, I E) 4440, 4520

*Marketing*—MKT 3010

*Community Development*—select one course from four of the following groups:

- Applied Economics*—APEC 2020, 3520  
*Community Development*—APEC 3570, 4110, 4120

*Economics*—ECON 2110, 2120

*Health*—APEC (HLTH) 3610

*International Trade*—CHIN 3160, 4160, SPAN 3160, 4050, 4160, 4170

*Rural Sociology*—RS (SOC) 4010, (SOC) 4590, SOC 3710, (RS) 4710

*Sociology*—SOC 4330

<sup>2</sup>Select two courses (six hours) from two different fields: ANTH 2010, GEOG 1030, HIST 1720, 1730, 1930, POSC 1020, 1040, PSYC 2010, SOC 2010.

<sup>3</sup>See General Education Requirements. For students not taking the CH 1050/1060 sequence, three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>4</sup>Internship must be taken in a country where the target language is spoken. The study abroad courses and internship must be taken concurrently as listed during the second semester of the junior year or later or during the summer.

<sup>5</sup>Select from any 3000–4000-level courses in the target language except SPAN 3100.

<sup>6</sup>Select from any 3000–4000-level courses in HLTH.

**LANGUAGE AND INTERNATIONAL TRADE****Bachelor of Arts**

Students in the Bachelor of Arts program in Language and International Trade acquire communicative competence in the target language; a familiarity with specific peoples, cultures, literatures, and business environments; and the knowledge and skills to pursue graduate studies or careers in business within their language of specialization.

The Language and International Trade program combines foreign languages and international trade. Students choose one language concentration (Chinese, French, German, Japanese, or Spanish) and one professional concentration (Applied International Economics, International Trade, or Tourism).

The language component emphasizes speaking and writing skills, culture, civilization, and business/technical languages. The professional component introduces students to the core content of their preferred concentration, as well as to the international dimensions of that concentration.

Study abroad of at least one semester in the target language setting is mandatory. In addition, each student is required to complete an internship with an international company in the United States or a summer internship with a company abroad. Internships are subject to approval by the Language and International Trade Director. Students are strongly encouraged to participate in the Clemson Language Immersion Program (CLIP) prior to enrolling in study abroad programs.

In addition to the curriculum requirements below, students are required, as a condition of graduation, to pass a noncredit examination and submit a noncredit senior dossier to assess their language competence in various areas. Both assessments take place in the student's last full semester at the University.

**Freshman Year****First Semester**

- 4 - CHIN 1010 Elementary Chinese *or*  
4 - FR 1010 Elementary French *or*  
4 - GER 1010 Elementary German *or*  
4 - JAPN 1010 Elementary Japanese *or*  
4 - SPAN 1040 Basic Spanish<sup>1</sup>  
3 - ENGL 1030 Accelerated Composition  
1 - LIT 1270 Introduction to LIT  
3 - MATH 1020 Intro. to Mathematical Analysis  
4 - Natural Science Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 3 - ACCT 2010 Financial Accounting Concepts *or*  
3 - ACCT 2020 Managerial Account. Concepts  
4 - CHIN 1020 Elementary Chinese *or*  
4 - FR 1020 Elementary French *or*  
4 - GER 1020 Elementary German *or*  
4 - JAPN 1020 Elementary Japanese *or*  
3 - SPAN 2010 Intermediate Spanish  
3 - MATH 2070 Multivariable Calculus  
3 - Oral Communication Requirement<sup>2</sup>  
2-3 - Elective
- 
- 15

<sup>1</sup>Students with no previous study of Spanish may take SPAN 1010 and 1020.

<sup>2</sup>See General Education Requirements.

## APPLIED INTERNATIONAL ECONOMICS CONCENTRATION

### Sophomore Year

#### First Semester

- 3 - APEC 2020 Agricultural Economics
  - 3 - CHIN 2010 Intermediate Chinese *or*
  - 3 - FR 2010 Intermediate French *or*
  - 3 - GER 2010 Intermediate German *or*
  - 3 - JAPN 2010 Intermediate Japanese *or*
  - 3 - SPAN 2020 Intermediate Spanish
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

#### Second Semester

- 3 - APEC 3090 Econ. of Agricultural Marketing
  - 3 - CHIN 2020 Intermediate Chinese *or*
  - 3 - FR 2020 Intermediate French *or*
  - 3 - GER 2020 Intermediate German *or*
  - 3 - JAPN 2020 Intermediate Japanese *or*
  - 3 - SPAN 3020 Intermediate Spanish Grammar and Composition *or*
  - 3 - SPAN 3060 Span. Composition for Bus.
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

### Junior Year

#### First Semester

- 3 - APEC 3190 Agribusiness Management
  - 3 - CHIN 3050 Chinese Conv. and Comp. I *or*
  - 3 - FR 3050 Intermediate French Conversation and Composition I *or*
  - 3 - GER 3050 German Conv. and Comp. *or*
  - 3 - GER 3060 German Short Story *or*
  - 3 - JAPN 3050 Japanese Conv. and Comp. *or*
  - 3 - SPAN 3050 Intermediate Spanish Conversation and Composition I
  - 3 - ENGL 3040 Business Writing
  - 3 - MKT 3020 Consumer Behavior
  - 3 - Advanced Social Science Requirement<sup>3</sup>
- 15

#### Second Semester

- 3 - CHIN 3160 Chinese for International Trade I *or*
  - 3 - FR 3160 French for International Trade I *or*
  - 3 - GER 3160 German for Int'l Trade I *or*
  - 3 - JAPN 3160 Japanese for Int'l Trade I *or*
  - 3 - SPAN 3160 Spanish for Int'l Trade I
  - 3 - MGT 2010 Principles of Management
  - 3 - Advanced Agricultural Econ. Requirement<sup>4</sup>
  - 3 - Advanced Foreign Language Requirement<sup>5</sup>
  - 3 - Elective
- 15

### Summer

- 3 - LIT 4000 LIT Internship

### Senior Year

#### First Semester

- 3 - CHIN 4160 Chinese for Int'l Trade II *or*
  - 3 - FR 4160 French for International Trade II *or*
  - 3 - GER 4160 German for Int'l Trade II *or*
  - 3 - JAPN 4160 Japanese for Int'l Trade II *or*
  - 3 - SPAN 4160 Spanish for Int'l Trade II
  - 3 - ECON 3100 International Economy *or*
  - 3 - ECON 4120 International Microeconomics
  - 3 - MKT 4270 International Marketing
  - 3 - Advanced Agricultural Econ. Requirement<sup>4</sup>
  - 3 - Foreign Language Civilization Requirement<sup>6</sup>
- 15

#### Second Semester

- 2 - LANG 4990 Language ePortfolio
  - 3 - MGT 4230 International Management
  - 6 - Advanced Foreign Language Requirement<sup>5</sup>
  - 3 - Advanced Social Science Requirement<sup>3</sup>
- 14

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>Six credit hours selected from two different areas: ANTH 2010, GEOG 1030, HIST 1720, 1730, 1930, POSC 1020, 1040, PSYC 2010

<sup>3</sup>Select from 3000-4000-level courses in ANTH, APEC, ECON, GEOG, HIST, POSC, PSYC, SOC

<sup>4</sup>APEC 3510, 4020, 4080, 4090, 4520, 4560, or 4600

<sup>5</sup>A minimum of nine credit hours of 3000-4000-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 1000-2000 levels. FR 4380 and 4390 and SPAN 4380 and 4390 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

<sup>6</sup>CHIN (ANTH) 4180, 4990, FR 3070, 3170, GER 3400, 4050, 4550, JAPN 3070, 3080, (ANTH) 4170, 4990, SPAN 3070, 3080, or 4350

## INTERNATIONAL TRADE CONCENTRATION

### Sophomore Year

#### First Semester

- 3 - CHIN 2010 Intermediate Chinese *or*
  - 3 - FR 2010 Intermediate French *or*
  - 3 - GER 2010 Intermediate German *or*
  - 3 - JAPN 2010 Intermediate Japanese *or*
  - 3 - SPAN 2020 Intermediate Spanish
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - MGT 2010 Principles of Management
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

#### Second Semester

- 3 - CHIN 2020 Intermediate Chinese *or*
  - 3 - FR 2020 Intermediate French *or*
  - 3 - GER 2020 Intermediate German *or*
  - 3 - JAPN 2020 Intermediate Japanese *or*
  - 3 - SPAN 3020 Intermediate Spanish Grammar and Composition *or*
  - 3 - SPAN 3060 Span. Composition for Bus.
  - 3 - ECON 2120 Principles of Macroeconomics
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

### Junior Year

#### First Semester

- 3 - CHIN 3050 Chinese Conv. and Comp. I *or*
  - 3 - FR 3050 Intermediate French Conversation and Composition I *or*
  - 3 - GER 3050 German Conv. and Comp. *or*
  - 3 - GER 3060 German Short Story *or*
  - 3 - JAPN 3050 Japanese Conv. and Comp. *or*
  - 3 - SPAN 3050 Intermediate Spanish Conversation and Composition I
  - 3 - ECON 3140 Intermediate Microeconomics
  - 3 - ENGL 3040 Business Writing
  - 3 - MKT 3020 Consumer Behavior
  - 3 - Advanced Social Science Requirement<sup>3</sup>
- 15

#### Second Semester

- 3 - CHIN 3160 Chinese for International Trade I *or*
  - 3 - FR 3160 French for International Trade I *or*
  - 3 - GER 3160 German for Int'l Trade I *or*
  - 3 - JAPN 3160 Japanese for Int'l Trade I *or*
  - 3 - SPAN 3160 Spanish for Int'l Trade I
  - 3 - ECON 3150 Intermediate Macroeconomics
  - 3 - Advanced Foreign Language Requirement<sup>4</sup>
  - 3 - Advanced Marketing Requirement<sup>5</sup>
  - 3 - Elective
- 15

### Summer

- 3 - LIT 4000 LIT Internship

### Senior Year

#### First Semester

- 3 - CHIN 4160 Chinese for Int'l Trade II *or*
  - 3 - FR 4160 French for International Trade II *or*
  - 3 - GER 4160 German for Int'l Trade II *or*
  - 3 - JAPN 4160 Japanese for Int'l Trade II *or*
  - 3 - SPAN 4160 Spanish for Int'l Trade II
  - 3 - MKT 4270 International Marketing
  - 3 - Advanced Business Requirement<sup>6</sup>
  - 3 - Foreign Language Civilization Requirement<sup>7</sup>
  - 3 - Elective
- 15

#### Second Semester

- 2 - LANG 4990 Language ePortfolio
  - 3 - MGT 4230 International Management
  - 6 - Advanced Foreign Language Requirement<sup>5</sup>
  - 3 - Advanced Social Science Requirement<sup>3</sup>
- 14
- 122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>Six credit hours selected from two different areas: ANTH 2010, GEOG 1030, HIST 1720, 1730, 1930, POSC 1020, 1040, PSYC 2010

<sup>3</sup>Select from 3000-4000-level courses in ANTH, APEC, ECON, GEOG, HIST, POSC, PSYC, SOC

<sup>4</sup>A minimum of nine hours of 3000-4000-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 1000-2000 levels. FR 4380 and 4390 and SPAN 4380 and 4390 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

<sup>5</sup>Any 3000- or 4000-level MKT course

<sup>6</sup>Any 3000- or 4000-level APEC, ECON, MGT or MKT course

<sup>7</sup>CHIN (ANTH) 4180, 4990, FR 3070, 3170, GER 3400, 4050, 4550, JAPN 3070, 3080, (ANTH) 4170, 4990, SPAN 3070, 3080, or 4350

**TOURISM CONCENTRATION****Sophomore Year****First Semester**

- 3 - CHIN 2010 Intermediate Chinese *or*
  - 3 - FR 2010 Intermediate French *or*
  - 3 - GER 2010 Intermediate German *or*
  - 3 - JAPN 2010 Intermediate Japanese *or*
  - 3 - SPAN 2020 Intermediate Spanish
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - PRTM 3420 Introduction to Tourism
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 3 - CHIN 2020 Intermediate Chinese *or*
  - 3 - FR 2020 Intermediate French *or*
  - 3 - GER 2020 Intermediate German *or*
  - 3 - JAPN 2020 Intermediate Japanese *or*
  - 3 - SPAN 3020 Intermediate Spanish Grammar and Composition *or*
  - 3 - SPAN 3060 Span. Composition for Bus.
  - 3 - MKT 3010 Principles of Marketing
  - 3 - PRTM 3050 Safety and Risk Mgt. in PRTM *or*
  - 3 - PRTM 3430 Spatial Aspects of Tourist Behavior *or*
  - 3 - PRTM 3440 Tourism Markets and Supply
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 15

**Junior Year****First Semester**

- 3 - CHIN 3050 Chinese Conv. and Comp. I *or*
  - 3 - FR 3050 Intermediate French Conversation and Composition I *or*
  - 3 - GER 3050 German Conv. and Comp. *or*
  - 3 - GER 3060 German Short Story *or*
  - 3 - JAPN 3050 Japanese Conv. and Comp. *or*
  - 3 - SPAN 3050 Intermediate Spanish Conversation and Composition I
  - 3 - ENGL 3040 Business Writing
  - 3 - MKT 3020 Consumer Behavior
  - 3 - Advanced PRTM Requirement<sup>3</sup>
  - 3 - Advanced Social Science Requirement<sup>4</sup>
- 
- 15

**Second Semester**

- 3 - CHIN 3160 Chinese for International Trade I *or*
  - 3 - FR 3160 French for International Trade I *or*
  - 3 - GER 3160 German for Int'l Trade I *or*
  - 3 - JAPN 3160 Japanese for Int'l Trade I *or*
  - 3 - SPAN 3160 Spanish for Int'l Trade I
  - 3 - MGT 2010 Principles of Management
  - 3 - Advanced Foreign Language Requirement<sup>5</sup>
  - 3 - Advanced PRTM Requirement<sup>3</sup>
  - 3 - Elective
- 
- 15

**Summer**

- 3 - L&IT 4000 L&IT Internship

**Senior Year****First Semester**

- 3 - CHIN 4160 Chinese for Int'l Trade II *or*
  - 3 - FR 4160 French for International Trade II *or*
  - 3 - GER 4160 German for Int'l Trade II *or*
  - 3 - JAPN 4160 Japanese for Int'l Trade II *or*
  - 3 - SPAN 4160 Spanish for Int'l Trade II
  - 3 - ECON 3100 International Economy *or*
  - 3 - ECON 4120 International Microeconomics
  - 3 - MKT 4270 International Marketing
  - 3 - Advanced PRTM Requirement<sup>3</sup>
  - 3 - Foreign Language Civilization Requirement<sup>6</sup>
- 
- 15

**Second Semester**

- 2 - LANG 4990 Language ePortfolio
  - 3 - MGT 4230 International Management
  - 6 - Advanced Foreign Language Requirement<sup>5</sup>
  - 3 - Advanced Social Science Requirement<sup>4</sup>
- 
- 14

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>Six credit hours selected from two different areas: ANTH 2010, GEOG 1030, HIST 1720, 1730, 1930, POSC 1020, 1040, PSYCH 2010

<sup>3</sup>See advisor.

<sup>4</sup>Select from 3000-4000-level courses in ANTH, APEC, ECON, GEOG, HIST, POSC, PSYC, SOC

<sup>5</sup>A minimum of nine hours of 3000-4000-level foreign language courses is required. At least one course must be in literature. Advanced grammar is recommended for those exempting 1000-2000 levels. FR 4380 and 4390 and SPAN 4380 and 4390 may not be used to satisfy requirements for the French or Spanish Concentration. Students may not take more than one foreign language course taught in English.

<sup>6</sup>CHIN (ANTH) 4180, 4990, FR 3070, 3170, GER 3400, 4050, 4550, JAPN 3070, 3080, (ANTH) 4170, 4990, SPAN 3070, 3080, or 4350

**MODERN LANGUAGES****Bachelor of Arts**

The Bachelor of Arts degree in Modern Languages provides a broadly humanistic course of study in seven areas of concentration: American Sign Language, Chinese, French, German, Italian, Japanese, and Spanish. This course of study seeks to provide students with basic competence in both the relevant language and the literary and cultural heritage pertaining to that language. Moreover, students will be required to take at least two courses in cultural inquiry which are designed to sharpen their sense of cultural difference, to enhance their critical thinking skills, and to prepare them for citizenship in a global community of diverse cultural precepts and practices. In this respect, the Bachelor of Arts in Modern Languages is intended to prepare students for a wide range of careers in the international arena as well as for the kinds of graduate programs that are an appropriate starting point for such careers.

All Modern Languages students are required to study abroad with a Clemson-approved program for at least one semester in the case of Japanese and Spanish or for at least two semesters in the case of French and German.

As a condition of graduation, students in the Modern Languages program will be required to pass a noncredit examination and to submit an electronic portfolio in the relevant language to assess their competence in that language. Students should see their advisor for details. Both assessments take place in the student's last full semester of study.

**AMERICAN SIGN LANGUAGE EMPHASIS AREA****Freshman Year****First Semester**

- 4 - ASL 1010 American Sign Language
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - Mathematics Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 16

**Second Semester**

- 4 - ASL 1020 American Sign Language
  - 3 - Mathematics or Natural Science Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
  - 2 - Elective
- 
- 16

**Sophomore Year****First Semester**

- 3 - ASL 2010 American Sign Language II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Fine Arts Requirement<sup>2</sup>
  - 3 - Minor Requirement
  - 4 - Elective
- 
- 16

**Second Semester**

- 3 - ASL 2020 American Sign Language II
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - History Requirement<sup>2</sup>
  - 3 - Minor Requirement
  - 3 - Elective
- 
- 15

**Junior Year****First Semester**

- 3 - LANG 3030 Study Abroad Transfer<sup>2</sup>
  - 3 - Advanced Language Requirement<sup>2</sup>
  - 3 - Major Requirement<sup>3</sup>
  - 3 - Minor Requirement
  - 3 - Elective
- 
- 15

**Second Semester**

- 3 - Advanced Arts and Humanities Requirement<sup>2</sup>
  - 3 - Major Requirement<sup>3</sup>
  - 3 - Methodology and Theory Requirement<sup>2</sup>
  - 3 - Minor Requirement
  - 3 - Elective
- 
- 15

**Senior Year****First Semester**

- 2 - LANG 499 Language Portfolio
  - 3 - Major Requirement<sup>3</sup>
  - 3 - Methodology and Theory Requirement<sup>2</sup>
  - 3 - Minor Requirement
  - 4 - Elective
- 
- 15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
 6 - Major Requirement<sup>3</sup>  
 3 - Methodology and Theory Requirement<sup>2</sup>  
 12

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>See advisor.

<sup>3</sup>Three credit hours from ASL 3020 and a minimum of 12 credit hours of ASL 3000-4000-level courses is required.

**CHINESE EMPHASIS AREA****Freshman Year****First Semester**

4 - CHIN 1010 Elementary Chinese  
 3 - ENGL 1030 Accelerated Composition  
 3 - Mathematics Requirement<sup>1</sup>  
 3 - Oral Communication Requirement<sup>1</sup>  
 3 - Social Science Requirement<sup>1</sup>  
 16

**Second Semester**

4 - CHIN 1020 Elementary Chinese  
 3 - Mathematics or Natural Science Requirement<sup>1</sup>  
 4 - Natural Science Requirement<sup>1</sup>  
 3 - Social Science Requirement<sup>1</sup>  
 2 - Elective  
 16

**Sophomore Year****First Semester**

3 - CHIN 2010 Intermediate Chinese  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
 3 - Fine Arts Requirement<sup>2</sup>  
 3 - Minor Requirement  
 4 - Elective  
 16

**Second Semester**

3 - CHIN 2020 Intermediate Chinese  
 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
 3 - History Requirement<sup>2</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Junior Year****First Semester**

3 - LANG 3030 Study Abroad Transfer<sup>2</sup>  
 3 - Advanced Language Requirement<sup>2</sup>  
 3 - Major Requirement<sup>3</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
 3 - Major Requirement<sup>3</sup>  
 3 - Methodology and Theory Requirement<sup>2</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Senior Year****First Semester**

2 - LANG 4990 Language Portfolio  
 3 - Major Requirement<sup>3</sup>  
 3 - Methodology and Theory Requirement<sup>2</sup>  
 3 - Minor Requirement  
 4 - Elective  
 15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
 6 - Major Requirement<sup>3</sup>  
 3 - Methodology and Theory Requirement<sup>2</sup>  
 12

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>See advisor.

<sup>3</sup>Select from CHIN 3000-4000-level courses. At least one course must be in literature. No more than two courses taught in English may be taken.

**FRENCH EMPHASIS AREA****Freshman Year****First Semester**

3 - ENGL 1030 Accelerated Composition  
 4 - FR 1010 Elementary French<sup>1</sup>  
 3 - Mathematics Requirement<sup>2</sup>  
 3 - Oral Communication Requirement<sup>2</sup>  
 3 - Social Science Requirement<sup>2</sup>  
 16

**Second Semester**

4 - FR 1020 Elementary French<sup>1</sup>  
 3 - Mathematics or Natural Science Requirement<sup>2</sup>  
 4 - Natural Science Requirement<sup>2</sup>  
 3 - Social Science Requirement<sup>2</sup>  
 2 - Elective  
 16

**Sophomore Year****First Semester**

3 - FR 2010 Intermediate French  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>  
 3 - Fine Arts Requirement<sup>3</sup>  
 3 - Minor Requirement  
 4 - Elective  
 16

**Second Semester**

3 - FR 2020 Intermediate French  
 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>  
 3 - History Requirement<sup>3</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Junior Year****First Semester**

3 - FR 3050 Intermediate French Conversation and Composition  
 3 - LANG 3030 Study Abroad Transfer<sup>3</sup>  
 3 - Major Requirement<sup>4</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>3</sup>  
 3 - Major Requirement<sup>4</sup>  
 3 - Methodology and Theory Requirement<sup>3</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15

**Senior Year****First Semester**

2 - LANG 4990 Language Portfolio  
 3 - Major Requirement<sup>4</sup>  
 3 - Methodology and Theory Requirement<sup>3</sup>  
 3 - Minor Requirement  
 4 - Elective  
 15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>3</sup>  
 6 - Major Requirement<sup>4</sup>  
 3 - Methodology and Theory Requirement<sup>3</sup>  
 12

120 Total Semester Hours

<sup>1</sup>Students who have had previous instruction in French may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>3</sup>See advisor.

<sup>4</sup>Three credit hours from FR 3000 or 3040, three credit hours from FR 3070 or 3170, and a minimum of nine credit hours of FR 3000-4000-level courses is required, of which at least one course must be in literature at the 4000 level. No more than one course taught in English may be taken.

**GERMAN EMPHASIS AREA****Freshman Year****First Semester**

4 - GER 1010 Elementary German<sup>1</sup>  
 3 - ENGL 1030 Accelerated Composition  
 3 - Mathematics Requirement<sup>2</sup>  
 3 - Oral Communication Requirement<sup>2</sup>  
 3 - Social Science Requirement<sup>2</sup>  
 16

**Second Semester**

4 - GER 1020 Elementary German<sup>1</sup>  
 3 - Mathematics or Natural Science Requirement<sup>2</sup>  
 4 - Natural Science Requirement<sup>2</sup>  
 3 - Social Science Requirement<sup>2</sup>  
 2 - Elective  
 16

**Sophomore Year****First Semester**

3 - GER 2010 Intermediate German  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>  
 3 - Fine Arts Requirement<sup>3</sup>  
 3 - Minor Requirement  
 4 - Elective  
 16

**Second Semester**

3 - GER 2020 Intermediate German  
 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>  
 3 - History Requirement<sup>3</sup>  
 3 - Minor Requirement  
 3 - Elective  
 15



**Junior Year****First Semester**

3 - GER 3050 Ger. Conversation and Comp. or  
3 - GER 3060 German Short Story  
3 - LANG 3030 Study Abroad Transfer<sup>3</sup>  
3 - Major Requirement<sup>4</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>3</sup>  
3 - Major Requirement<sup>4</sup>  
3 - Methodology and Theory Requirement<sup>3</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Senior Year****First Semester**

2 - LANG 4990 Language Portfolio  
3 - Major Requirement<sup>4</sup>  
3 - Methodology and Theory Requirement<sup>3</sup>  
3 - Minor Requirement  
4 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>3</sup>  
6 - Major Requirement<sup>4</sup>  
3 - Methodology and Theory Requirement<sup>3</sup>  
12

120 Total Semester Hours

<sup>1</sup>Students who have had previous instruction in German may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>3</sup>See advisor.

<sup>4</sup>A minimum of 15 credit hours of GER 3000-4000-level courses is required, of which at least two courses must be in literature. No more than one course taught in English may be taken.

**ITALIAN EMPHASIS AREA****Freshman Year****First Semester**

3 - ENGL 1030 Accelerated Composition  
4 - ITAL 1010 Elementary Italian  
3 - Mathematics Requirement<sup>1</sup>  
3 - Oral Communication Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>1</sup>  
16

**Second Semester**

4 - ITAL 1020 Elementary Italian  
3 - Mathematics or Natural Science Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>1</sup>  
2 - Elective  
16

**Sophomore Year****First Semester**

3 - ITAL 2010 Intermediate Italian  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
3 - Fine Arts Requirement<sup>2</sup>  
3 - Minor Requirement  
4 - Elective  
16

**Second Semester**

3 - ITAL 2020 Intermediate Italian  
3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
3 - History Requirement<sup>2</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Junior Year****First Semester**

3 - LANG 3030 Study Abroad Transfer<sup>2</sup>  
3 - Advanced Language Requirement<sup>2</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Senior Year****First Semester**

2 - LANG 4990 Language Portfolio  
3 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
3 - Minor Requirement  
4 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
6 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
12

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>See advisor.

<sup>3</sup>Three credit hours from ITAL 3010 or 3020 and a minimum of 12 credit hours of ITAL 3000-4000-level courses is required, of which at least one course must be in literature. No more than one course taught in English may be taken.

**JAPANESE EMPHASIS AREA****Freshman Year****First Semester**

3 - ENGL 1030 Accelerated Composition  
4 - JAPN 1010 Elementary Japanese  
3 - Mathematics Requirement<sup>1</sup>  
3 - Oral Communication Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>1</sup>  
16

**Second Semester**

4 - JAPN 1020 Elementary Japanese  
3 - Mathematics or Natural Science Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>1</sup>  
3 - Social Science Requirement<sup>1</sup>  
2 - Elective  
16

**Sophomore Year****First Semester**

3 - JAPN 2010 Intermediate Japanese  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
3 - Fine Arts Requirement<sup>2</sup>  
3 - Minor Requirement  
4 - Elective  
16

**Second Semester**

3 - JAPN 2020 Intermediate Japanese  
3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
3 - History Requirement<sup>2</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Junior Year****First Semester**

3 - JAPN 3050 Japanese Conversation and Comp.  
3 - LANG 3030 Study Abroad Transfer<sup>2</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
3 - Minor Requirement  
3 - Elective  
15

**Senior Year****First Semester**

2 - LANG 4990 Language Portfolio  
3 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
3 - Minor Requirement  
4 - Elective  
15

**Second Semester**

3 - Advanced Arts and Humanities Requirement<sup>2</sup>  
6 - Major Requirement<sup>3</sup>  
3 - Methodology and Theory Requirement<sup>2</sup>  
12

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>See advisor.

<sup>3</sup>Select from 3000-4000-level courses in Japanese. At least one course must be in literature. No more than two courses taught in English may be taken.

**SPANISH EMPHASIS AREA****Freshman Year****First Semester**

3 - ENGL 1030 Accelerated Composition  
4 - SPAN 1010 Elementary Spanish<sup>1</sup>  
3 - Mathematics Requirement<sup>2</sup>  
3 - Oral Communication Requirement<sup>2</sup>  
3 - Social Science Requirement<sup>2</sup>  
16

**Second Semester**

- 4 - SPAN 1020 Elementary Spanish<sup>1</sup>
- 3 - Mathematics or Natural Science Requirement<sup>2</sup>
- 4 - Natural Science Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>
- 2 - Elective
- 16

**Sophomore Year****First Semester**

- 3 - SPAN 2010 Intermediate Spanish
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 3 - Fine Arts Requirement<sup>3</sup>
- 3 - Minor Requirement
- 4 - Elective
- 16

**Second Semester**

- 3 - SPAN 2020 Intermediate Spanish
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - History Requirement<sup>3</sup>
- 3 - Minor Requirement
- 3 - Elective
- 15

**Junior Year****First Semester**

- 3 - LANG 3030 Study Abroad Transfer<sup>3</sup>
- 3 - SPAN 3020 Intermediate Spanish Grammar and Composition *or*
- 3 - SPAN 3050 Intermediate Spanish Conversation and Composition
- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement
- 3 - Elective
- 15

**Second Semester**

- 3 - Advanced Arts and Humanities Requirement<sup>3</sup>
- 3 - Major Requirement<sup>5</sup>
- 3 - Methodology and Theory Requirement<sup>3</sup>
- 3 - Minor Requirement
- 3 - Elective
- 15

**Senior Year****First Semester**

- 2 - LANG 4990 Language Portfolio
- 3 - Major Requirement<sup>5</sup>
- 3 - Methodology and Theory Requirement<sup>3</sup>
- 3 - Minor Requirement
- 4 - Elective
- 15

**Second Semester**

- 3 - Advanced Arts and Humanities Requirement<sup>3</sup>
- 6 - Major Requirement<sup>5</sup>
- 3 - Methodology and Theory Requirement<sup>3</sup>
- 12

120 Total Semester Hours

<sup>1</sup>Students who have had previous instruction in Spanish may take an accelerated one-semester course that covers the material presented in the standard first-year sequence. They must then take four additional elective credit hours.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>3</sup>See advisor.

<sup>4</sup>Select from 3000- or 4000-level courses in Spanish.

<sup>5</sup>Select from 4000-level courses in Spanish.

**PAN AFRICAN STUDIES****Bachelor of Arts**

The Bachelor of Arts in Pan African Studies combines the interdisciplinary study of the African Diaspora, with an emphasis on the contributions African descendants have made to contemporary Western society. Majors learn to ask critical questions about the social, economic, political, and familial contributions Africans have made to Western society and to identify the connections between Africans in diverse cultures. An interdisciplinary curriculum that combines coursework in African and African American studies is supplemented by numerous practical work experiences and opportunities.

The major provides a strong foundation for students interested in advanced degrees in the humanities or social sciences and for students pursuing careers in law, business, government, non-profit organizations, social work, and work related to improving the lives of economically and socially disadvantaged people locally, nationally, and internationally. Students develop strong oral and written communication skills, gain exposure to different cultures, and learn the skills they need to navigate ethnically diverse environments. The program is designed to work well as a double major for students in the humanities, social sciences, education, engineering and business fields.

The program of study includes the courses stipulated in the curriculum below. The major consists of 33 credits. All students take an 18 credit core of required courses (Group I) that consists of an introductory class, Introduction to Pan African Studies (PAS 3010), and the Atlantic World (PAS 1010); African American History to 1877 (HIST 3110), African American History 1877-Present (HIST 3120); a theories and methods course (students choose from PAS 4000, 4100, or 4710), and a capstone senior seminar (PAS 4980/6980). In addition to this core, students take six credit hours from courses that focus entirely on race and ethnicity (Group II courses); six credit hours from courses that involve a substantial focus on racial issues (Group III courses); and three credit hours in approved race or ethnicity courses from the humanities or social sciences (Group IV).

Group I – PAS 1010; PAS 3010; HIST 3110; HIST 3120; PAS 4000, 4100 or 4710; and a capstone senior seminar (PAS 4980/6980)

Group II – courses focus entirely on cultural and racial issues. Select six credits from GEOG 3300, HIST 3370, 3380, 3390, 4380

Group III – courses have a substantial focus on racial issues. Select six credits from ENGL 4820, 4830, POSC 3810, SOC 4600, THEA 3170

Group IV – Select three credits from any 3000-4000-level course in the humanities or the social sciences approved by the Director of the Pan African Studies Program

Courses must be scheduled in consultation with the appropriate advisors. Pan African Studies advisors provide other affected advisors with a list of approved courses prior to registration.

**Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition
- 4 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>
- 14

**Second Semester**

- 3 - PAS 1010 Africa and the Atlantic World
- 3 - PAS 3010 Introduction to Pan African Studies
- 4 - Foreign Language Requirement<sup>1</sup>
- 3 - Natural Science Requirement<sup>2</sup>
- 3 - Oral Communication Requirement<sup>2</sup>
- 16

**Sophomore Year****First Semester**

- 3 - HIST 3120 African American History from 1877-Present
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - HIST 3110 African American History to 1877
- 3 - PAS 4000 Studies in Pan African Studies *or*
- 3 - PAS 4100 Studies in Africana Experience *or*
- 3 - PAS 4710 Directed Studies on the Black Experience in Education
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Major Requirement (Group II)
- 15

**Junior Year****First Semester**

- 3 - THEA 3170 African American Theatre I
- 3 - Major Requirement (Group III)
- 3 - Major Requirement (Group IV)
- 3 - Minor Requirement
- 3 - Elective
- 15

**Second Semester**

- 3 - HIST 3380 African History to 1875 *or*
- 3 - HIST 3390 Modern Africa, 1875 to the Present
- 3 - Major Requirement (Group II)
- 6 - Minor Requirement
- 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - HIST 3380 African History to 1875 *or*
- 3 - HIST 3390 Modern Africa, 1875 to the Present
- 3 - Major Requirement (Group III)
- 3 - Minor Requirement
- 6 - Elective
- 15

**Second Semester**

- 3 - PAS 4980 Seminar on Pan African Studies
- 3 - Minor Requirement
- 9 - Elective
- 15

120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

## PHILOSOPHY

### Bachelor of Arts

The required course of study in Philosophy consists of the basic curriculum and either the standard Philosophy major, the Philosophy major with a Religious Studies Emphasis Area, or the Philosophy major with a Law, Liberty and Justice Emphasis Area. Philosophy majors must meet the requirements of the School of Humanities plus complete HIST 1720 and 1730 and 12 hours of 3000-4000-level coursework in one of the following areas: humanities (other than philosophy), math, science, or social science. Some courses may meet more than one requirement. All Philosophy majors must take PHIL 3990 in the junior year. Preparation of the portfolio should begin as soon as the major is declared. Specific requirements include the following:

Standard Philosophy Major—PHIL 3150, 3160, 4010 or 4020, and 24 additional credits in PHIL selected with the advice and consent of the advisor. Three of these credits may be at the 1000 level.

Law, Liberty and Justice Emphasis Area—PHIL 1020, 3150, 3160, 3040 or 3200 or 3210, 3430, 4010 or 4020, HIST 3280, 3290, and nine additional credits in philosophy selected with the advice and consent of the pre-law advisor. Students with this emphasis area are strongly advised to include POSC 4370 and/or 4380 as an elective, minor, or advanced area requirement.

Religious Studies Emphasis Area—REL 1010 or 1020, 3010, 3020, 4010 or 4020, PHIL 3030, 3150, 3160, 4010 or 4020, and nine additional credits selected with the advice and consent of the advisor. Of these nine credits, three must be in philosophy and three must be in religion courses at the 3000 level or above. (POSC 4070 may count as a religion course.) The remaining three credits may be in philosophy or religion but must be at the 3000 level or above. Students with this emphasis area must choose a minor other than Religion.

Pre-law and Pre-medicine students majoring in Philosophy should consult the departmental advisor for help in tailoring the program to their needs.

### Freshman Year

#### First Semester

3 - ENGL 1030 Accelerated Composition  
3 - HIST 1720 The West and the World I  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Mathematics Requirement<sup>2</sup>  
4 - Natural Science Requirement<sup>2</sup>  
16

#### Second Semester

3 - HIST 1730 The West and the World II  
3 - Foreign Language Requirement<sup>1</sup>  
3 - Mathematics or Natural Science Requirement<sup>2</sup>  
3 - Oral Communication Requirement<sup>2</sup>  
3 - Social Science Requirement<sup>2</sup>  
15

## Sophomore Year

### First Semester

3 - Cross-Cultural Awareness Requirement<sup>2</sup>  
3 - Science and Tech. in Society Requirement<sup>2</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Minor Requirement<sup>4</sup>  
3 - Elective  
15

### Second Semester

3 - Arts and Humanities (Literature) Requirement<sup>2</sup>  
6 - Major Requirement<sup>3</sup>  
3 - Minor Requirement<sup>4</sup>  
3 - Elective  
15

## Junior Year

### First Semester

6 - Advanced Area Requirement<sup>5</sup>  
6 - Major Requirement<sup>3</sup>  
3 - Minor Requirement<sup>4</sup>  
15

### Second Semester

2 - PHIL 3990 Philosophy Portfolio  
9 - Major Requirement<sup>3</sup>  
3 - Minor Requirement<sup>4</sup>  
3 - Elective  
17

## Senior Year

### First Semester

6 - Advanced Area Requirement<sup>5</sup>  
3 - Major Requirement<sup>3</sup>  
3 - Minor Requirement<sup>4</sup>  
12

### Second Semester

6 - Major Requirement<sup>3</sup>  
9 - Elective  
15  
120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>See major requirements in program description above.

<sup>4</sup>See page 80 for approved minors. Students with a Religious Studies Emphasis Area may not minor in Religion.

<sup>5</sup>Select from 3000-4000-level courses in the humanities (must be from an area other than philosophy), mathematical sciences, science, or the social sciences.

## PRODUCTION STUDIES IN PERFORMING ARTS

### Bachelor of Arts

The Production Studies in Performing Arts degree is a nationally distinctive Bachelor of Arts degree that prepares students for careers in many aspects of the arts, including but not limited to performance, design, arts administration, and arts technologies. The curriculum offers specialized study in music, theatre, and audio technology. In addition to discipline-specific concentrations, all performing arts students take classes in performance, production, history, theory, and arts technology. The Brooks Center for the Performing Arts is a living performing arts laboratory where visiting artists and industry professionals

provide additional experiential educational opportunities for Clemson students. Students may choose from more than 70 minors and select elective courses to tailor their degrees to their individual interests.

The degree is rooted in the liberal arts tradition with specific training in the performing arts. It provides the background for a number of career options or advanced studies such as graduate school, professional internships, and specialized postgraduate training.

The curriculum features a senior capstone project in which students spend a semester of their final year working as a production team—writing, composing, designing, marketing, and performing a final project with a strong service component.

To be considered for admission to this program, students must undergo an interview/audition with the Department of Performing Arts. Please note that students will not be eligible for admission to Clemson University in Production Studies in Performing Arts until this interview/audition is completed. Contact the department for specific requirements.

As a requirement for graduation, all Music Concentration students will be required to demonstrate piano competence equivalent to the 1020 level, and all Audio Technology students will be required to demonstrate piano competence equivalent to the 1010 level.

## AUDIO TECHNOLOGY CONCENTRATION

### Freshman Year

#### First Semester

3 - AUD 1850 Introduction to Audio Technology  
4 - MATH 1020 Precalculus and Introduction to Mathematical Analysis<sup>1</sup>  
1 - MUSC 1010 Beginning Class Piano<sup>2</sup>  
3 - PA 1010 Introduction to Performing Arts  
1 - PA 1030 Portfolio I  
3 - PHYS 2070 General Physics I or  
3 - PHYS 1220 Physics with Calculus I  
1 - PHYS 2090 General Physics I Laboratory or  
1 - PHYS 1240 Physics Laboratory I  
16

#### Second Semester

3 - AUD 2850 Acoustics of Music  
3 - ENGL 1030 Accelerated Composition  
3 - PHYS 2080 General Physics II or  
3 - PHYS 2210 Physics with Calculus II  
1 - PHYS 2100 General Physics II Laboratory or  
1 - PHYS 2230 Physics Laboratory II  
3 - Foreign Language Requirement<sup>3</sup>  
3 - Elective  
16

### Sophomore Year

#### First Semester

3 - AUD 2800 Sound Reinforcement  
3 - AUD 3800 Audio Engineering I  
3 - MUSC 1420 Music Theory I<sup>4</sup>  
1 - MUSC 1430 Aural Skills I<sup>4</sup>  
3 - PA 2010 Career Planning and Professional Development  
3 - Foreign Language Requirement<sup>3</sup>  
16

**Second Semester**

- 3 - AUD 3850 Adv. Live Sound Reinforcement *or*  
 3 - AUD 3860 Electr. Comp. and Sound Design  
 3 - MUSC 2100 Music Appreciation: Music in the  
 Western World  
 1 - PA 2790 Performing Arts Practicum I  
 3 - Social Science Requirement<sup>5</sup>  
 4 - Elective  
 14

**Junior Year****First Semester**

- 3 - AUD 4800 Audio Engineering II  
 1 - PA 2800 Performing Arts Practicum II  
 3 - PA 3010 Principles of Arts Administration  
 3 - Minor Requirement  
 3 - Music History Requirement<sup>6</sup>  
 3 - Social Science Requirement<sup>5</sup>  
 16

**Second Semester**

- 3 - AUD 2790 Audio Practicum  
 3 - COMM 2500 Public Speaking  
 3 - MUSC 3180 History of Audio Technology  
 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>  
 3 - Minor Requirement  
 15

**Senior Year****First Semester**

- 4 - PA 4010 Capstone Project  
 1 - PA 4030 Portfolio II  
 6 - Minor Requirement  
 3 - Music History Requirement<sup>6</sup>  
 14

**Second Semester**

- 3 - AUD 4850 Production Workshop  
 3 - PA 3990 Internship  
 3 - Minor Requirement  
 3 - Music Requirement<sup>7</sup>  
 3 - Elective  
 15

122 Total Semester Hours

<sup>1</sup>MATH 1060 or 1070 may be substituted.<sup>2</sup>Audio Technology students may demonstrate piano competence at the MUSC 1010 level with a competency test and not have to take the class. Students will still be responsible for this hour of credit by substituting another class.<sup>3</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.<sup>4</sup>Students minoring in music must also take MUSC 1440/1450.<sup>5</sup>See General Education Requirements.<sup>6</sup>Must be chosen from MUSC 3080, 3090, 3110, 3120, 3130, 3140, 3170, 4150, or 4160.<sup>7</sup>Select any 3000- or 4000-level MUSC course.

Note: Audio Concentration majors must earn a C or better in all required AUD, MUSC and PHYS courses, including those satisfying the music requirement and music history requirement.

**MUSIC CONCENTRATION****Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition  
 1 - MUSC 1010 Beginning Class Piano  
 3 - MUSC 1420 Music Theory I  
 1 - MUSC 1430 Aural Skills I  
 1 - MUSC 1530 Applied Music for Majors<sup>1</sup>  
 3 - PA 1010 Introduction to Performing Arts  
 1 - PA 1030 Portfolio I  
 3 - Foreign Language Requirement<sup>2</sup>  
 1 - Large Ensemble Requirement<sup>3</sup>  
 17

**Second Semester**

- 1 - MUSC 1020 Intermediate Class Piano  
 3 - MUSC 1440 Music Theory II  
 1 - MUSC 1450 Aural Skills II  
 1 - MUSC 1540 Applied Music for Majors<sup>1</sup>  
 3 - THEA 2100 Theatre Appreciation (Humanities  
 Non-Lit Requirement)  
 3 - Foreign Language Requirement<sup>2</sup>  
 1 - Large Ensemble Requirement<sup>3</sup>  
 3 - Mathematics Requirement<sup>4</sup>  
 16

**Sophomore Year****First Semester**

- 3 - MUSC 2420 Music Theory III  
 1 - MUSC 2430 Aural Skills III  
 1 - MUSC 2530 Applied Music for Majors<sup>1</sup>  
 3 - PA 2010 Career Planning and Professional Dev.  
 1 - PA 2790 Performing Arts Practicum I  
 1 - Large Ensemble Requirement<sup>3</sup>  
 3 - Mathematics or Natural Science Requirement<sup>4</sup>  
 3 - Social Science Requirement<sup>4</sup>  
 16

**Second Semester**

- 1 - MUSC 2540 Applied Music for Majors<sup>1</sup>  
 1 - PA 2800 Performing Arts Practicum II  
 3 - Arts and Humanities (Literature) Requirement<sup>4</sup>  
 1 - Large Ensemble Requirement<sup>3</sup>  
 3 - Music History Requirement<sup>5</sup>  
 4 - Natural Science Requirement<sup>4</sup>  
 3 - Social Science Requirement<sup>4</sup>  
 16

**Junior Year****First Semester**

- 3 - COMM 2500 Public Speaking  
 1 - MUSC 3530 Applied Music for Majors<sup>1</sup>  
 3 - MUSC 4150 Music History to 1750  
 3 - PA 3010 Principles of Arts Administration  
 3 - Minor Requirement  
 2 - Elective  
 15

**Second Semester**

- 3 - MUSC 1800 Introduction to Music Technology  
 1 - MUSC 3540 Applied Music for Majors<sup>1</sup>  
 3 - MUSC 4160 Music History Since 1750  
 3 - MUSC 4300 Conducting  
 3 - Minor Requirement  
 2 - Elective  
 15

**Senior Year****First Semester**

- 4 - PA 4010 Capstone Project  
 1 - PA 4030 Portfolio II  
 3 - Minor Requirement  
 3 - Music History Requirement<sup>5</sup>  
 3 - Elective  
 14

**Second Semester**

- 6 - Minor Requirement  
 6 - Elective  
 12

121 Total Semester Hours

<sup>1</sup>All four credits of Applied Music must be taken on the student's primary instrument.<sup>2</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.<sup>3</sup>Select from MUSC 3610, 3620, 3630, 3640, 3690, 3700, 3710, 3720 only. No more than two credits of MUSC 3610 and/or 3640 will count toward ensemble requirement. All four credits of Large Ensemble must be taken on the student's primary instrument. Keyboard students must take a minimum of one hour each of MUSC 3230, applied organ, and applied carillon for three of the four required ensemble credits.<sup>4</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.<sup>5</sup>MUSC 3080, 3090, 3110, 3120, 3130, 3140, 3170, or 3180<sup>6</sup>Note: As a requirement for graduation, Music Concentration students will be required to demonstrate piano competence at the 1020 level.**THEATRE CONCENTRATION****Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition  
 3 - MUSC 2100 Music Appreciation  
 3 - PA 1010 Introduction to Performing Arts  
 1 - PA 1030 Portfolio I  
 1 - PA 2790 Performing Arts Practicum I  
 3 - THEA 2780 Acting I  
 3 - Foreign Language Requirement<sup>1</sup>  
 17

**Second Semester**

- 1 - PA 2800 Performing Arts Practicum II  
 3 - THEA 2770 Production Studies in Theatre *or*  
 3 - THEA 3770 Stagecraft  
 3 - Foreign Language Requirement<sup>1</sup>  
 3 - Mathematics Requirement<sup>1</sup>  
 4 - Elective  
 14

**Sophomore Year****First Semester**

- 3 - PA 2010 Career Planning and Professional  
 Development  
 3 - THEA 3150 Theatre History I  
 3 - THEA (ENGL) 3470 The Structure of Drama  
 3 - Mathematics or Natural Science Requirement<sup>2</sup>  
 3 - Elective  
 15

**Second Semester**

- 1 - THEA 2790 Theatre Practicum
- 3 - THEA 3160 Theatre History II
- 4 - Natural Science Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>
- 4 - Elective
- 15

**Junior Year****First Semester**

- 3 - PA 3010 Principles of Arts Administration
- 3 - THEA 3170 African American Theatre I or  
3 - THEA 3180 African American Theatre II
- 3 - THEA 3760 Stage Directing I
- 3 - Minor Requirement
- 3 - Social Science Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - Advanced Theatre Requirement<sup>3</sup>
- 3 - Dramatic Literature Requirement<sup>4</sup>
- 3 - Minor Requirement
- 6 - Elective
- 15

**Senior Year****First Semester**

- 3 - COMM 2500 Public Speaking
- 4 - PA 4010 Capstone Project
- 1 - PA 4030 Portfolio II
- 1 - THEA 2790 Theatre Practicum
- 3 - Minor Requirement
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 15

**Second Semester**

- 1 - THEA 2790 Theatre Practicum
- 6 - Advanced Theatre Requirement<sup>3</sup>
- 6 - Minor Requirement
- 2 - Elective
- 15

121 Total Semester Hours

<sup>1</sup>Students are expected to complete the first year of language in high school or in a Clemson summer session before the first semester of the freshman year, except for Chinese or Japanese.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirements.

<sup>3</sup>Select from 3000- or 4000-level courses in THEA. At least three hours must be at the 4000 level.

<sup>4</sup>Must be chosen from ENGL (THEA) 4290, THEA (ENGL) 4300, ENGL 4100 or 4110.

**RELIGIOUS STUDIES****Bachelor of Arts**

The Religious Studies major is an interdisciplinary humanities program that focuses on the academic study of the world's religious traditions and how they are related to various aspects of human existence (psychology, sociology, ethics, philosophy, language, economics, politics, science, etc.) The BA in Religious Studies provides grounding in the histories, scriptures, rituals, mythologies, ethics, and beliefs of religious communities as they have been situated in specific geo-political contexts throughout the past three millennia. It should be emphasized that the program is not intended to indoctrinate students into one particular religion or to teach them to become religious, but is focused rather on studying how

religion both historically and theoretically motivates, provides meaning for, and helps to organize human life. The program trains students to be global thinkers with a deeper understanding of the world's cultural, political, and social differences. Historically, Religious Studies majors have gone on to pursue graduate work and employment in a number of fields, including law, medicine, ministry, non-profit and service related industries, in addition to numerous others.

In addition to completing the General Education curriculum, the Religious Studies major must meet the requirements of the School of Humanities; complete HIST 1720 and 1730; and complete six hours of 3000-4000 level coursework in Philosophy. Students are encouraged to substitute a double-major for their minor and should speak with their advisor early during their academic tenure at Clemson to ensure that both majors are completed within four years.

All majors must take REL 1020, 3000, 3990, and 4900. They must also take one course each in Judaism (REL 3010 or 3060), Christianity (REL 3020 or 3070), and Islam (REL 3030 or 3150), as well as 12 additional credits in Religious Studies at the 3000-4000 level. Students may also take ENGL 4140, HIST 3960, 4720, PHIL 3030, POSC 4070, and SOC 4320 for this last requirement. PHIL 3030 may only be used to satisfy one major requirement.

**Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition
- 3 - HIST 1720 The West and the World I
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics Requirement<sup>2</sup>
- 4 - Natural Science Requirement<sup>2</sup>
- 16

**Second Semester**

- 3 - HIST 1730 The West and the World II
- 3 - REL 1020 World Religions
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics or Natural Science Requirement<sup>2</sup>
- 3 - Oral Communication Requirement<sup>2</sup>
- 15

**Sophomore Year****First Semester**

- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 6 - Major Requirement<sup>3</sup>
- 3 - Science and Technology in Society Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - REL 3000 Studying Religion
- 3 - Major Requirement<sup>3</sup>
- 3 - Minor Requirement<sup>4</sup>
- 3 - Philosophy Requirement<sup>5</sup>
- 3 - Elective
- 15

**Junior Year****First Semester**

- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 6 - Major Requirement<sup>3</sup>
- 3 - Minor Requirement<sup>4</sup>
- 3 - Elective
- 15

**Second Semester**

- 3 - REL 3990 Junior Research Colloquium
- 3 - Cross-Cultural Awareness Requirement<sup>2</sup>
- 3 - Major Requirement<sup>3</sup>
- 3 - Minor Requirement<sup>4</sup>
- 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - REL 4900 Senior Seminar
- 3 - Major Requirement<sup>3</sup>
- 3 - Minor Requirement<sup>4</sup>
- 6 - Elective
- 15

**Second Semester**

- 3 - Minor Requirement<sup>4</sup>
- 3 - Philosophy Requirement<sup>5</sup>
- 9 - Elective
- 15

121 Total Semester Hours

<sup>1</sup>The Foreign Language Requirement for the School of Humanities is proficiency requirement. Students must complete through 2020 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian or Spanish.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>See major requirements in program description above.

<sup>4</sup>See the CAAH list of approved minors. Students who want to minor in philosophy must complete the requisite coursework above and beyond the two required philosophy courses for the major. Students who want to double major in philosophy, on the other hand, may count these hours towards a double major.

<sup>5</sup>Any 3000- or 4000-level PHIL course.

**SPORTS COMMUNICATION****Bachelor of Arts**

The Bachelor of Arts in Sports Communication provides a thoroughly integrated yet individualized degree program that prepares students for communication careers in the sports industry. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in sports communication. Through their coursework and extracurricular experiences, Sports Communication majors develop a set of skills in oral, written, and visual communication that enables them to research, design, present, and evaluate messages across diverse contexts and from a variety of platforms, including social media and digital communication technology.

Students may change majors into the Sports Communication program based on approval of a committee of faculty from the Department of Communication Studies. The deadline for applying for a change of major during the fall semester is September 15, with decisions made by October 1. For spring semester changes of major, the deadline is February 15, with decisions made by March 1. Acceptance to the major is competitive and applicants should have completed 15 credit hours, including ENGL 1030 and COMM 2010 (with a B or better). All students requesting a transfer into the Sports Communication major must have a grade-point average of 3.0 or higher. An application form and a writing sample are also required. Detailed information is available from the Communication Studies Department, 408 Strode Tower, or on the departmental Web site: [www.clemson.edu/caah/communication](http://www.clemson.edu/caah/communication).

**Freshman Year****First Semester**

- 1 - COMM 1010 Communication Academic and Professional Development I
- 3 - ENGL 1030 Accelerated Composition
- 4 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>3</sup>
- 14

**Second Semester**

- 4 - COMM 2010 Intro. to Communication Studies
- 3 - COMM 2500 Public Speaking
- 4 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics or Natural Science Requirement<sup>3</sup>
- 3 - Elective
- 17

**Sophomore Year****First Semester**

- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
- 3 - Emphasis Area Requirement<sup>4</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>3</sup>
- 3 - Social Science Requirement<sup>3</sup>
- 16

**Second Semester**

- 3 - COMM 3010 Communication Theory *or*
- 3 - COMM 3020 Mass Comm. Theory *or*
- 3 - COMM 3150 Critical Discourse Theory
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 6 - Elective
- 15

**Junior Year****First Semester**

- 3 - COMM 3240 Sport, Communication, and Society
- 3 - Emphasis Area Requirement<sup>4</sup>
- 6 - Minor Requirement
- 3 - Elective
- 15

**Second Semester**

- 3 - COMM 3060 Discourse, Criticism and Soc. *or*
- 3 - COMM 3100 Quantitative Research Methods in Communication Studies *or*
- 3 - COMM 3110 Qualitative Research Methods in Communication Studies
- 3 - COMM 3250 Survey of Sports Communication
- 3 - Minor Requirement
- 3 - Emphasis Area Requirement<sup>4</sup>
- 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - COMM 4250 Advanced Sports Communication
- 3 - Emphasis Area Requirement<sup>4</sup>
- 3 - Minor Requirement
- 6 - Elective
- 15

**Second Semester**

- 3 - COMM 4950 Senior Capstone Seminar
- 1 - COMM 4980 Communication Academic and Professional Development II
- 3 - Minor Requirement
- 6 - Elective
- 13
- 120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>STAT 2220 or 2300

<sup>3</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness Requirement and, if STAT 2220 is not selected, the Science and Technology in Society Requirement.

<sup>4</sup>See advisor. Emphasis area consists of 12 credit hours at the 3000-4000 level that fit an approved theme. Nine credit hours must be sports communication courses.

**VISUAL ARTS****Bachelor of Fine Arts**

The Bachelor of Fine Arts degree is the recognized professional undergraduate degree in the visual arts. The program offers students a balanced curriculum of academic coursework and studio art and art history courses in preparation for careers in studio-related areas of the visual arts. The department offers coursework in a number of studio disciplines, including ceramics, drawing, painting, printmaking, photography, sculpture and the new media arts.

First-year art students participate in a foundations program comprised of four studio classes. These classes expose first-year art students to 2-D, 3-D, and 4-D studio practices; utilize traditional and new media; and place special emphasis on drawing. Near the end of the freshmen year, students exhibit their work in a mandatory Foundations Review.

In the sophomore year, students take studio courses in six disciplines, which provides an overview of the studio arts and exposes students to a broad range of studio experiences. Upon completion of this core of courses, students identify one studio discipline as their emphasis area in the Bachelor of Fine Arts program.

In the junior year, students fulfill requirements in their emphasis area in preparation for the Senior Studio experience. Requirements include intermediate and advanced courses in their chosen studio discipline.

The Senior Studio experience is comprised of three courses and provides students an opportunity to focus and refine their personal art concepts and skills, produce a cohesive body of artworks for their BFA exhibition, and develop their portfolio for graduate study or a career in studio-related art professions.

**Freshman Year****First Semester**

- 3 - AAH 1010 Survey of Art and Arch. History I
- 3 - ART 1050 Foundation Drawing I
- 3 - ART 1510 Foundations in Visual Art I
- 3 - ENGL 1030 Accelerated Composition
- 3 - Mathematics Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - AAH 1020 Survey of Art and Arch. History II
- 3 - ART 1060 Foundation Drawing II
- 3 - ART 1520 Foundations in Visual Art II
- 3 - ART 2210 Beginning New Media
- 4 - Natural Science Requirement<sup>1</sup>
- 16

**Sophomore Year****First Semester**

- 3 - AAH 2050 History and Theory of Art I
- 9 - Art 2000 Requirement<sup>2</sup>
- 3 - Mathematics or Natural Science Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - AAH 2060 History and Theory of Art II
- 9 - Art 2000 Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>1</sup>
- 15

**Junior Year****First Semester**

- 3 - AAH 3050 Contemporary Art History
- 3 - Art 3000 Emphasis Area Requirement<sup>3</sup>
- 3 - Art 3000/4000 Requirement<sup>4</sup>
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Oral Communication Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - Art 4000 Emphasis Area Requirement<sup>3</sup>
- 3 - Art 3000/4000 Requirement<sup>4</sup>
- 3 - Studio Requirement<sup>5</sup>
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - ART 4710 BFA Senior Studio I
- 3 - ART 4730 Sr. Sem. in Professional Career Prep.
- 3 - Art 3000/4000 Requirement<sup>4</sup>
- 3 - Studio Requirement<sup>5</sup>
- 3 - Elective
- 15

**Second Semester**

- 5 - ART 4720 BFA Senior Studio II
- 3 - Art 3000/4000 Requirement<sup>4</sup>
- 6 - Elective
- 14
- 120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Select from ART 2050, 2070, 2090, 2110, 2130 and 2170

<sup>3</sup>Select an emphasis area from one of the studio disciplines included in the required core courses.

<sup>4</sup>Any 3000-4000-level ART course

<sup>5</sup>Any ART course or other course approved by advisor

## WOMEN'S LEADERSHIP

### Bachelor of Arts

The Bachelor of Arts in Women's Leadership combines the interdisciplinary study of women's experience and representation with an emphasis on the key principles and practice of leadership. Students learn to ask critical questions about women's lives in social, economic, political, and familial contexts, and to see connections in women's lives across diverse cultures. This interdisciplinary curriculum combines coursework in women's studies and leadership studies and is supplemented by a semester-long internship that provides students with practical work experience and opportunities to test leadership skills and strategies.

The major provides a solid foundation for students interested in advanced degrees in the humanities or social sciences, and for students pursuing careers in law, business, government, non-profit organizations, and work related to improving the lives of women locally, nationally, and internationally. Students develop strong oral and written communication skills, gain exposure to different leadership styles and paths to leadership, and learn the competitive skills they need to lead ethically in a rapidly changing global environment. The program is designed to work well as a double-major for students in the humanities, social sciences, and business fields.

The major consists of 33 credits and the program of study includes the courses stipulated in the curriculum map below. All students take a 12-credit core of required courses (Group I), which consists of an introductory women's studies course (WS 1030 or 3010); a women and leadership course (WS 2300); a theories and methods course (WS 3490, 4230, 4360, or 4590); and a capstone senior seminar (WS 4010). In addition to this core, students select six credit hours from courses that focus entirely on women or gender (Group II); six credit hours from courses that involve a substantial focus on women and gender issues (Group III); and six credit hours from approved leadership courses (Group IV). In addition, students complete a three-credit internship. While program faculty and staff help with internship placement, it is each student's responsibility to identify and secure an internship in line with her or his career goals.

#### Group I—Core Courses (12 hours)

- WS 1030 or 3010 (students may count only one of these toward the major)
- WS 2300 (required of all majors)
- One of WS 3490, 4230, 4360, or 4590 (students who take more than one of these may apply the others toward the Group II distribution requirement)
- WS 4010

#### Group II—Courses that focus entirely on women or gender issues (six hours).

Select from ANTH 4230 COMM 4550, ENGL 3800, ENGL 4360, FR 4990, HIST 3180, 3190, 3530, HLTH 3100, PHIL 3490, POSC 4800, PRM 3250, PSYC 3080, 4990, SOC 4610, SPAN 4030, THEA 3170, 3180, WS 3490, 4230, 4360, 4590, 4900, 4950. Special topics courses in various departments may qualify as Group II courses. Students should consult an advisor.

#### Group III—Courses with a substantial focus on women or gender issues (six hours).

Select from AAH 3050, COMM 3060, 3070, 3150, 4800, ENGL 3530, 4320, 4560, FR 4100, HIST 3160, 3520, PHIL 3280, PSYC 3060, 4620, SOC 3100, 3110, 4600, 4840. Special topics courses in various departments may qualify as Group III courses. Students should consult an advisor.

#### Group IV—Approved leadership courses (six hours).

Select from HEHD 4000, 4100, 4200, ED 1900, ELE 3010, ML 1010, NPL 3000, POSC 4580.

### Freshman Year

#### First Semester

- 3 - ENGL 1030 Accelerated Composition
- 4 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>

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#### Second Semester

- 3 - WS 1030 Women in Global Perspective or  
3 - WS 3010 Introduction to Women's Studies
- 3 - Oral Communication Requirement<sup>2</sup>
- 4 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics and Natural Science Requirement<sup>2</sup>
- 3 - Elective

16

### Sophomore Year

#### First Semester

- 3 - Theory Requirement<sup>3</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>2</sup>

15

#### Second Semester

- 3 - WS 2300 Women and Leadership
- 3 - Distribution Requirement (Group II)
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Elective

15

### Junior Year

#### First Semester

- 3 - Leadership Requirement (Group IV)
- 3 - Distribution Requirement (Group III)
- 3 - Minor Requirement
- 3 - Cross Cultural Awareness Requirement<sup>2</sup>
- 3 - Elective

15

#### Second Semester

- 3 - Leadership Requirement (Group IV)
- 3 - Distribution Requirement (Group II)
- 6 - Minor Requirement
- 3 - Elective

15

### Senior Year

#### First Semester

- 3 - WS 3900 Women's Studies Internship
- 3 - Distribution Requirement (Group III)
- 3 - Minor Requirement
- 3 - Science & Tech. in Society Requirement<sup>2</sup>
- 3 - Elective

15

#### Second Semester

- 3 - WS 4010 Senior Seminar
- 3 - Minor Requirement
- 9 - Elective

15

120 Total Semester Hours

<sup>1</sup>The foreign language requirement is a proficiency requirement. Students must complete through 2020 in American Sign Language, Arabic, Chinese, French, German, Italian, Japanese, Latin, Portuguese, Russian, or Spanish.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>Select from WS 3490, 4230, 4360, or 4590.

## MINORS

Following are minors acceptable for students in the College of Architecture, Arts and Humanities. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management
Adult/Extension Education	Management Information Systems
Aerospace Studies	Mathematical Sciences
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages— <i>not open to Language and International Trade majors</i>
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Architecture	Nonprofit Leadership
Art	Packaging Science
Athletic Leadership	Pan African Studies
Biochemistry	Park and Protected Area Management
Biological Sciences	Philosophy
Business Administration	Physics
Chemistry	Plant Pathology
Cluster	Political Science
Communication Studies	Psychology
Computer Science	Public Policy
Crop and Soil Environmental Science	Recreational Therapy
Digital Production Arts	Religion— <i>not open to Philosophy or Religious Studies majors</i>
East Asian Studies	Russian Area Studies
Economics	Science and Technology in Society
Education	Screenwriting
English	Sociology
Entomology	Spanish-American Area Studies
Entrepreneurship	Sustainability
Environmental Science and Policy	Theatre
Equine Industry	Travel and Tourism
Film Studies	Turfgrass
Financial Management	Urban Forestry
Food Science	Wildlife and Fisheries Biology
Forest Products	Women's Studies
Forest Resource Management	Writing
Genetics	
Geography	See pages 39-42 for details.
Geology	
Global Politics	
Great Works	
History	
Horticulture	
Human Resource Management	
Legal Studies	



# COLLEGE OF BUSINESS AND BEHAVIORAL SCIENCE

Students in the College of Business and Behavioral Science seek to understand and organize human behavior in a business, economic, and social context. The College promotes scholarship with broad awareness of the individual, cultural, political, and global levels and develops distinctive leaders in industry, higher education, professional and public service. The College includes the School of Accountancy and Finance, and the Departments of Aerospace Studies, Economics, Graphic Communications, Management, Marketing, Military Leadership, Political Science, Psychology, and Sociology and Anthropology.

All College of Business and Behavioral Science majors, and other non-majors taking 3000- and 4000-level courses offered by the College, are required to pay a differential fee to fund significant infrastructure and program enhancements. Additional information about this fee and the benefits derived from it is available at [www.clemson.edu/cbbs/academics/fees](http://www.clemson.edu/cbbs/academics/fees).

## BUSINESS AND PROFESSIONAL PROGRAMS

Bachelor of Science degrees are offered in Accounting, Economics, Financial Management, Graphic Communications, Management, and Marketing. With the exception of Graphic Communications, these programs share a common curriculum during the first year, allowing the student maximum flexibility in choosing an appropriate major. The Business programs in Accounting, Financial Management, Management, and Marketing are accredited by AACSB International (Association to Advance Collegiate Schools of Business). The Accounting program has earned additional accounting accreditation by AACSB International. All business and professional curricula prepare students for a variety of careers and furnish an education that recognizes the need for an understanding of the basic principles of science, appreciation for the nature of human interaction, and the comprehension of the economic, political, and social environment.

## Pre-Business Program

The Pre-Business program provides students planning to earn Bachelor of Science degrees in Accounting, Economics, Financial Management, Management, and Marketing with a sound academic preparation for these degrees. All Pre-Business students complete a common curriculum during the freshman year. All new Business students (including transfer students) are admitted into the Pre-Business program until the following core classes are satisfactorily completed and the grade-point average requirement is met: BUS 1010, ECON 2110, 2120, MATH 1020, 2070 or acceptable sequence, ENGL 1030, and a natural science with laboratory requirement.

## Change of Major into Pre-Business

Students who change majors into Pre-Business must have completed at least 12 credit hours at Clemson and must have a 2.0 minimum cumulative grade-point average.

## Freshman Curriculum

### First Semester

- 1 - BUS 1010 Business Foundations<sup>1</sup>
- 3 - ECON 2110 Principles of Microeconomics<sup>1</sup>
- 3 - MATH 1020 Intro. to Math. Analysis<sup>1,2</sup> or
  - 4 - MATH 1060 Calculus of One Variable I<sup>1,2</sup>
- 3 - PSYC 2010 Introduction to Psychology or
  - 3 - SOC 2010 Introduction to Sociology
- 4 - Natural Science Requirement<sup>1,3</sup>
- 1 - Elective
- 15

### Second Semester

- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
- 3 - ECON 2120 Principles of Macroeconomics<sup>1</sup>
- 3 - ENGL 1030 Accelerated Composition<sup>1</sup>
- 3 - MATH 2070 Multivariable Calculus<sup>1,2</sup> or
  - 4 - MATH 1080 Calculus of One Variable II<sup>1,2</sup>
- 3 - Science and Tech. in Society Requirement<sup>3</sup>
- 15

<sup>1</sup>Freshman core curriculum class. Students must complete core classes before submitting a change-of-major request from Pre-Business to a business major.

<sup>2</sup>The following sequences are acceptable: MATH 1020/2070, 1060/1080, 1060/2070. For each of the four-credit-hour courses taken, one credit will be applied toward the elective credit-hour requirement. Students considering a graduate degree in Economics or related fields should take MATH 1060/1080.

<sup>3</sup>See General Education Requirements.

## Admission to Business Degree Programs

To be eligible for admission into the Bachelor of Science degree programs in Accounting, Economics, Financial Management, or Management, students must have completed the courses outlined in the freshman core curriculum and have a cumulative grade-point average of 2.0 or higher. Students wishing to enter the Marketing Program must have completed the freshman core curriculum and have a Clemson/Bridge cumulative grade-point average of 3.0 or higher.

Students should initiate a Request to Change Academic Program form with the College of Business and Behavioral Science Academic Advising Center in G-02 Sistine Hall after completing the freshman core curriculum. Students who fail to meet the requirements for admission to a degree-granting business program may remain in Pre-Business until those requirements are met, but only until 64 semester hours of coursework have been completed. Students who exceed 64 credit hours and still do not meet the requirements for admission into a degree program must declare another major.

## Transfer Credit Policy

For upper level undergraduates business courses (3000- and 4000-level courses with the rubrics of ACCT, BUS, ELE, FIN, LAW, MGT and MKT) transfer credits will only be accepted from AACSB International and/or EQUIS accredited institutions. Transfer credits from non-US institutions that do not hold either accreditation may be evaluated on a case-by-case basis.

## BEHAVIORAL AND SOCIAL SCIENCE PROGRAMS

Bachelor of Arts degrees are offered in Anthropology, Economics, Political Science, Psychology, and Sociology. Bachelor of Science degrees are also offered in Anthropology, Political Science, Psychology, and Sociology. These programs are designed to meet the needs of students seeking a broad general education as preparation for intelligent citizenship, commercial and industrial life, government service, research, and teaching. These curricula also provide an excellent background for the study of law, journalism, and medicine.

To achieve depth as well as breadth in the educational experience, students select a major consisting of courses above the sophomore level. Students also choose a minor consisting of additional credit hours. Students should contact their advisor for additional information and approval before pursuing a minor. See page 92 for a list of acceptable minors.

Students in Bachelor of Arts programs who plan to teach in public schools may elect education courses required for certification by the South Carolina State Department of Education. Such courses are to be approved by their own department advisors.

## ROTC PROGRAMS

### Aerospace Studies (AFROTC)

Air Force Reserve Officer Training Corps (AFROTC) is designed to "develop quality leaders for the Air Force." Students can earn a minor in Aerospace Studies and a commission as Second Lieutenants while pursuing a bachelor's degree. Clemson's program has won numerous local and national awards for excellence. The program includes courses in foundations of the Air Force, air power history, leadership and management, and national security affairs. In addition to courses, students participate in a weekly leadership laboratory. "Lead Lab" provides students a training environment to practice leadership principles in a cadet-led Air Force wing. Throughout the program, cadets hone their communication skills through various leadership positions, briefings, and papers. The first year of the program, *Foundations of the United States Air Force*, introduces students to the Air Force and AFROTC. It provides an overview of the basic characteristics, missions, and organization of the Air Force. The second year, *The Evolution of USAF Air and Space Power*, features topics on Air Force heritage and leaders; and introduces air and space power through examination of distinct capabilities and functions. The third year, *Air Force Leadership Studies*, teaches cadets advanced skills and knowledge in management and leadership. Special emphasis is placed on enhancing leadership skills. Cadets have an opportunity to try out these leadership and management techniques in a supervised environment as juniors and seniors. The fourth year, *National Security Affairs and Preparation for Active Duty*, is designed for college seniors and gives them the foundation to understand their role as military officers in American society. It is an overview of complex social and political issues facing the military profession and requires a measure of sophistication commensurate with the senior college level. Seniors are also prepared to enter active duty as they transition from student to Air Force Officer. For additional information, contact the Department of Aerospace Studies.

## Military Leadership (Army ROTC)

Army Reserve Officer Training Corps (Army ROTC) is all about leadership. Students that complete the entire program may earn a commission as a Lieutenant in the Army Reserve, National Guard, or Active Army. The first two years of the program are open to all students. During the freshman year, the focus is on learning individual leadership skills such as time management, leadership character, values, setting goals, and conducting meetings. The sophomore year emphasizes teamwork, team leading, communication/briefings, decision making, team values, and organizational culture and vision. Juniors primarily learn how to plan and conduct training for large groups and are evaluated in leadership positions. Seniors focus on organizational leadership. They plan and run the organization, conduct individual counseling, and evaluate the juniors' performance in leadership positions. This prepares them for their career as an Army Officer once they graduate. A minor in Military Leadership can be earned by completing the program. Enrollment requires no military obligation until the sophomore year for those on an Army scholarship or the junior year for those without a scholarship. Additional information is available from the Military Leadership Department.

## ACCOUNTING

### Bachelor of Science

The program leading to the Bachelor of Science degree in Accounting prepares students for careers as professional accountants. Students completing this program are well prepared to begin professional careers in corporate accounting or internal auditing or to continue study at the graduate level.

Students planning to become Certified Public Accountants should note that the requirements for certification in South Carolina include 150 hours of collegiate education and completion of a bachelor's degree. Other states have similar requirements. The Accounting faculty of the School of Accountancy and Finance believes these requirements are best met with a bachelor's degree in Accounting and completion of the Master of Professional Accountancy (MPAcc) degree program. The MPAcc program also enhances the preparation of students pursuing accounting careers in areas of specialization such as assurance services and taxation.

Admission to the MPAcc program is separate from admission to the undergraduate program. It is based on the student's undergraduate record and score on the Graduate Management Admissions Test (GMAT). For information, contact the School of Accountancy and Finance, 300 Sistine Hall.

In addition to accounting and business courses, the Bachelor of Science curriculum is devoted to English, public speaking, mathematics, natural and social sciences, and the humanities. Thus, students in the accounting program obtain a broad-based education that not only gives them accounting expertise but also contributes to their proficiency in analytical, communication, and interpersonal skills. Along with the general business accreditation held by the College, the Accounting degree programs offered by the School of Accountancy and Finance are separately accredited by AACSB International,

the only accrediting agency for accounting programs. Students wishing to change majors into the accounting program must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

## Sophomore Year

### First Semester

- 3 - ACCT 2010 Financial Accounting Concepts
  - 3 - MGT 2010 Principles of Management
  - 3 - STAT 3090 Introductory Business Statistics
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Elective
- 15

### Second Semester

- 1 - ACCT 2040 Accounting Procedures
  - 3 - MGT 2180 Management Personal Computer Applications
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Cross-Cultural Awareness Requirement<sup>1</sup>
  - 3 - Elective
- 16

## Junior Year

### First Semester

- 3 - ACCT 3110 Intermediate Financial Acct. I
  - 3 - ACCT 3220 Accounting Information Systems
  - 3 - ENGL 3040 Business Writing
  - 3 - FIN 3110 Financial Management I
  - 3 - Fine Arts Requirement<sup>2</sup>
- 15

### Second Semester

- 3 - ACCT 3120 Intermediate Financial Acct. II
  - 3 - ACCT 4150 Auditing
  - 3 - FIN 3120 Financial Management II
  - 3 - LAW 3420 Legal Environment of Business
  - 3 - PHIL 3440 Business Ethics
  - 1 - Elective
- 16

## Senior Year

### First Semester

- 3 - ACCT 3030 Cost Accounting
  - 3 - ACCT 3130 Intermediate Financial Acct. III
  - 3 - ACCT 4040 Individual Taxation<sup>3</sup> or
  - 3 - ACCT 4060 Business Taxation<sup>3</sup>
  - 3 - MGT 3100 Intermediate Business Statistics
  - 3 - International Business Requirement<sup>4</sup>
- 15

### Second Semester

- 3 - ACCT 3990 Internship in Accounting<sup>5</sup> or
  - 3 - Business Requirement<sup>6</sup>
  - 3 - ACCT 4100 Contemporary Reporting and Management Control Systems
  - 3 - MGT 4150 Business Strategy<sup>7</sup>
  - 6 - Business Requirement<sup>6</sup>
- 15

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Note: Cross-Cultural Awareness Requirement may also be satisfied by some of these courses.

<sup>2</sup>AAH 2100, MUSC 2100, or THEA 2100

<sup>3</sup>Students planning to pursue the Master of Professional Accountancy degree program should take ACCT 4040.

<sup>4</sup>ECON 3100, FIN 4110, LAW 4200, MGT 4230, or MKT 4270

<sup>5</sup>Internship may be completed in the summer between junior and senior years with ACCT 4100, MGT 4150, and six hours of Business Requirement completed in the second semester of the senior year; or internship may be completed in the second semester of the senior year with ACCT 4100, MGT 4150, and six hours of Business Requirement completed during the summer sessions.

<sup>6</sup>Any three-credit 3000- or 4000-level course in ACCT, ECON, FIN, LAW, or MGT.

<sup>7</sup>MGT 4150 must be taken at Clemson University.

Note: At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

## ANTHROPOLOGY

### Bachelor of Arts

The Anthropology BA major prepares students for a variety of professional careers related to human resources, international business, public relations, museum and park service interpretation, health services, and other people-oriented positions in the public and private sector. In addition, the degree provides excellent preparation for graduate training in anthropology, law, health care, and business. The degree requires a total of 124 semester hours, including 39 credit hours in anthropology and sociology, as identified below. In addition, students take a foreign language and nine additional hours of social science or humanities courses related to Anthropology (from a department-approved list). These additional courses provide students with a greater depth and broader diversity of interdisciplinary knowledge useful for the direct application of an anthropological perspective to potential career paths. Courses used to fulfill General Education Requirements and Departmental Social Science and Humanities courses may be used to fulfill minor requirements.

Students wishing to change majors into the Anthropology BA program must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

### Bachelor of Arts

#### Freshman Year

##### First Semester

- 3 - ANTH 2010 Introduction to Anthropology
  - 3 - MATH 1010 Essential Mathematics for the Informed Society
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
  - 3 - Elective
- 16

##### Second Semester

- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

#### Sophomore Year

##### First Semester

- 3 - Science and Technology in Society Requirement<sup>2</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 6-7 - Subfield Requirement<sup>5</sup>
- 15-16

**Second Semester**

1 - SOC 2050 Sociology Lab  
 3 - Anthropology Requirement  
 3 - Departmental Humanities/Social Science Requirement<sup>4</sup>  
 6 - Minor Requirement<sup>3</sup>  
 3-4 - Subfield Requirement<sup>5</sup>  
 16-17

**Junior Year****First Semester**

6 - Anthropology Requirement  
 3 - Departmental Humanities/Social Science Requirement<sup>4</sup>  
 6 - Elective  
 15

**Second Semester**

6 - ANTH 4040 Anthropological Theories *and/or* Anthropology Requirement  
 3 - Departmental Humanities/Social Science Requirement<sup>4</sup>  
 6 - Minor Requirement<sup>3</sup>  
 15

**Summer Semester**

3 - Practicing Anthropology Requirement<sup>6</sup>  
 3

**Senior Year****First Semester**

3 - Anthropology Requirement  
 3 - Minor Requirement<sup>3</sup>  
 9 - Elective  
 15

**Second Semester**

3 - ANTH 4040 Anthropological Theories *and/or* Anthropology Requirement  
 1 - ANTH 4970 Senior Capstone  
 3 - Minor Requirement<sup>3</sup>  
 6 - Elective  
 13

124 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language are required.

<sup>2</sup>See General Education Requirements. (Note: Social Science Requirement must be in an area other than anthropology.)

<sup>3</sup>See page 92 for approved minors.

<sup>4</sup>Select from a department-approved list.

<sup>5</sup>ANTH 3010, 3310 or 3510.

<sup>6</sup>ANTH 4950, 4980, or an approved Field School, Internship, or Study Abroad experience.

**ANTHROPOLOGY****Bachelor of Science**

The Anthropology B.S. major prepares students for a variety of professional careers related to museum and park service interpretation, forensic science, health services, and other scientifically-oriented positions in the public and private sector. In addition, the Bachelor's degree provides excellent preparation for graduate training in anthropology, medicine, and human factors engineering. The degree requires a total of 124 semester hours, including 39 credit hours in anthropology and sociology, as identified below. In addition, students take 15 hours of math and/or science courses (from a department-approved list). These additional courses provide students with

a greater depth and broader diversity of interdisciplinary knowledge useful for the direct application of an anthropological perspective to potential career paths. Courses used to fulfill General Education Requirements and Departmental Science and Math courses may be used to fulfill minor requirements.

Students wishing to change majors into the Anthropology BS program must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

**Bachelor of Science****Freshman Year****First Semester**

3 - ANTH 2010 Introduction to Anthropology  
 3 - MATH 1010 Essential Mathematics for the Informed Society  
 4 - Natural Science Requirement<sup>1</sup>  
 3 - Social Science Requirement<sup>1</sup>  
 3 - Elective  
 16

**Second Semester**

3 - COMM 1500 Intro. to Human Comm. *or*  
 3 - COMM 2500 Public Speaking  
 3 - ENGL 1030 Accelerated Composition  
 3 - STAT 2300 Statistical Methods I  
 3 - Departmental Math. or Science Requirement<sup>2</sup>  
 3 - Elective  
 15

**Sophomore Year****First Semester**

3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
 3 - Departmental Math. or Science Requirement<sup>2</sup>  
 3 - Minor Requirement<sup>3</sup>  
 6-7 - Subfield Requirement<sup>4</sup>  
 15-16

**Second Semester**

1 - SOC 2050 Sociology Lab  
 3 - Anthropology Requirement  
 3 - Arts and Humanities (Non-Lit) Requirement<sup>1</sup>  
 3 - Departmental Math. or Science Requirement<sup>2</sup>  
 3 - Science and Technology in Society Requirement<sup>1</sup>  
 3-4 - Subfield Requirement<sup>4</sup>  
 16-17

**Junior Year****First Semester**

6 - Anthropology Requirement  
 3 - Departmental Math. or Science Requirement<sup>2</sup>  
 6 - Elective  
 15

**Second Semester**

6 - ANTH 4040 Anthropological Theories *and/or*  
 6 - Anthropology Requirement  
 3 - Departmental Math. or Science Requirement<sup>2</sup>  
 6 - Minor Requirement<sup>2</sup>  
 15

**Summer Semester**

3 - Practicing Anthropology Requirement<sup>5</sup>  
 3

**Senior Year****First Semester**

3 - Anthropology Requirement  
 3 - Minor Requirement<sup>3</sup>  
 9 - Elective  
 15

**Second Semester**

3 - ANTH 4040 Anthropological Theories *and/or*  
 3 - Anthropology Requirement  
 1 - ANTH 4970 Senior Capstone  
 3 - Minor Requirement<sup>3</sup>  
 6 - Elective  
 13

124 Total Semester Hours

<sup>1</sup>See General Education Requirements. (Note: Social Science Requirement must be in an area other than anthropology.)

<sup>2</sup>Select from a department-approved list.

<sup>3</sup>See page 92 for approved minors.

<sup>4</sup>ANTH 3010, 3310 or 3510.

<sup>5</sup>ANTH 4950, 4980, or an approved Field School, Internship, or Study Abroad experience.

**ECONOMICS**

A bachelor's degree in Economics provides a thorough understanding of business, society, and public policy and prepares students for a wide range of careers. By combining general education courses and a strong course of study in economics, students can prepare for graduate studies in business, law, or any of the social sciences, as well as for careers in business and government.

The Department of Economics offers two undergraduate degree paths. The Bachelor of Arts degree emphasizes foreign language skills and offers students maximum freedom to tailor their course of study to their specific interests and career goals. A broad choice of minors is available for this program. The Bachelor of Arts program requires 30 credit hours in economics, which should be satisfied by completing ECON 2110, 2120, and 24 credits of coursework above the sophomore level. Bachelor of Arts majors must complete ECON 3140 and 3150. ECON 4050 is strongly recommended but not required.

The Bachelor of Science program emphasizes business applications. It requires 31 credit hours in economics, which should be satisfied by completing ECON 2110, 2120, and 25 credits of coursework above the sophomore level. Bachelor of Science majors must complete ECON 4050 in addition to 3140 and 3150. Students wishing to change majors into the Bachelor of Science program in Economics must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

**Minors**

A minor field is required of students in both the Bachelor of Arts and the Bachelor of Science degree programs. Economics majors may choose, in consultation with their advisors, any University-approved minor (see page 92).

Students who wish to combine the curriculum in Economics with secondary-school teaching should take the degree in Education with a teaching area in Economics. The courses taken will be those required for teaching certification as specified by the South Carolina Department of Education, as well as those required for an Economics major.

### Combined Bachelor's/Master's Plan

The Department of Economics allows students to count up to 12 hours of graduate credit (8000-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point average of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Department of Economics.

### Dual Degree Program with Université Catholique de Louvain in Belgium

The Economics Department has a dual degree program with the Université Catholique de Louvain in Belgium. Students spend one semester taking courses at the University of Maastricht in The Netherlands and two semesters at UCL in Louvain la Neuve, Belgium. The instruction at Maastricht is in English, and the instruction at UCL is in French. After returning to Clemson to complete their studies, students will earn bachelor degrees from both Clemson and UCL. Students must be proficient in French to participate in the program. Interested students should contact the Department of Economics for information.

### Change of Major into Bachelor of Arts in Economics

Students who change majors into Bachelor of Arts in Economics must have a 2.0 minimum Clemson/Bridge cumulative grade-point average.

### Bachelor of Arts

#### Freshman Year

##### First Semester

3 - ECON 2110 Principles of Microeconomics  
3 - MATH 1020 Intro. to Mathematical Analysis<sup>1</sup>  
3 - Foreign Language Requirement<sup>2</sup>  
4 - Natural Science Requirement<sup>3</sup>  
2 - Elective  
15

##### Second Semester

3 - ECON 2120 Principles of Macroeconomics  
3 - ENGL 1030 Accelerated Composition  
3 - MATH 2070 Multivariable Calculus<sup>1</sup>  
3 - Foreign Language Requirement<sup>2</sup>  
3 - Science and Tech. in Society Requirement<sup>4</sup>  
15

#### Sophomore Year

##### First Semester

3 - ECON 3140 Intermediate Microeconomics  
3 - MATH 3020 Stats. for Science and Engineering<sup>5</sup> or  
3 - STAT 3090 Introductory Business Statistics  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>  
3 - Elective  
15

##### Second Semester

3 - ECON 3150 Intermediate Macroeconomics  
3 - HIST 1730 The West and the World II<sup>6</sup>  
3 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
3 - Elective  
15

### Junior Year

#### First Semester

3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking  
3 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
6 - Elective  
15

#### Second Semester

6 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
6 - Elective  
15

### Senior Year

#### First Semester

3 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
9 - Elective  
15

#### Second Semester

3 - Major Requirement<sup>7</sup>  
3 - Minor Requirement  
9 - Elective  
15

120 Total Semester Hours

<sup>1</sup>The following sequences are also acceptable: MATH 1060/1080; and MATH 1060/2070. Students considering a graduate degree in Economics should begin with MATH 1060.

<sup>2</sup>Two semesters (through 2020) in the same modern foreign language are required.

<sup>3</sup>See General Education Requirements.

<sup>4</sup>See General Education Requirements. This requirement may be satisfied by other courses in the curriculum. In this case, elective hours must be substituted.

<sup>5</sup>Students considering a graduate degree in Economics or related fields should take MATH 3020.

<sup>6</sup>This course satisfies the cross-cultural requirement.

Three credit hours must be selected from ECON 3440, 3500, 3600, 4020, 4040, 4100, 4240, 4260, 4350, 4550. Note: Only ECON courses numbered 3160 and above may be used to satisfy the Major Requirement.

## ECONOMICS

### Bachelor of Science

#### Sophomore Year

##### First Semester

3 - ACCT 2010 Financial Accounting Concepts<sup>1</sup>  
3 - ECON 3140 Intermediate Microeconomics  
3 - MATH 3020 Stats. for Science and Engineering<sup>2</sup> or  
3 - STAT 3090 Introductory Business Statistics  
3 - MGT 2010 Principles of Management  
3 - Elective  
15

##### Second Semester

3 - ACCT 2020 Managerial Accounting Concepts  
3 - ECON 3150 Intermediate Macroeconomics  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>  
3 - Cross-Cultural Awareness Requirement<sup>3</sup>  
15

### Junior Year

#### First Semester

4 - ECON 4050 Introduction to Econometrics  
3 - FIN 3060 Corporation Finance<sup>1,4</sup>  
3 - Major Requirement<sup>5</sup>  
3 - Minor Requirement  
3 - Elective  
16

#### Second Semester

3 - Major Requirement<sup>5</sup>  
6 - Minor Requirement  
6 - Elective  
15

### Senior Year

#### First Semester

3 - Major Requirement<sup>5</sup>  
3 - Minor Requirement  
9 - Elective  
15

#### Second Semester

6 - Major Requirement<sup>5</sup>  
3 - Minor Requirement  
5 - Elective  
14

120 Total Semester Hours

<sup>1</sup>Students who complete a minor in Accounting or Financial Management must complete three hours of electives to replace the ACCT 2010 or FIN 3060 requirement in the Economics major.

<sup>2</sup>Students considering a graduate degree in Economics or related fields should take MATH 3020.

<sup>3</sup>See General Education Requirements. Note: Cross-Cultural Awareness Requirement may be satisfied by other General Education courses, by the International Studies Requirement, or through the use of elective hours.

<sup>4</sup>FIN 3110 is recommended for Students minoring in Financial Management.

<sup>5</sup>Three credit hours must be selected from ECON 3440, 3500, 3600, 4020, 4040, 4100, 4240, 4260, 4350, 4550. Note: Only ECON courses numbered 3160 and above may be used to satisfy the Major Requirement.

Note: At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

## FINANCIAL MANAGEMENT

### Bachelor of Science

The Bachelor of Science in Financial Management is designed to develop an understanding of financial markets in the contemporary economy, the operation of financial institutions, and the financial management of business operations. The curriculum prepares students for careers in such areas as corporate finance, banking, investments, financial planning, insurance, and real estate. Governments of all levels also employ finance graduates in many of their divisions. The curriculum also provides excellent preparation for students interested in graduate studies or law school.

The core of the curriculum provides a broad range of subjects with an emphasis on technical and communication skills. Students then have the flexibility to tailor courses to their own needs by choosing emphasis areas that will enhance career preparation in specific areas of finance. Students who complete a specific set of courses are eligible to sit for the certified financial planner (CFP®) examination.

Students wishing to change majors into the financial management program must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

## Sophomore Year

### First Semester

- 3 - ACCT 2010 Financial Accounting Concepts
  - 3 - CPSC 2200 Microcomputer Applications *or*  
3 - MGT 2180 Mgt. Personal Computer Appl.
  - 3 - MGT 2010 Principles of Management
  - 3 - STAT 3090 Introductory Business Statistics
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 15

### Second Semester

- 1 - ACCT 2040 Accounting Procedures
  - 3 - MGT 3100 Intermediate Business Statistics
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Cross-Cultural Awareness Requirement<sup>2</sup>
  - 3 - Elective
- 16

## Junior Year

### First Semester

- 3 - ACCT 3110 Intermediate Financial Acct. I
  - 3 - ENGL 3040 Business Writing
  - 3 - FIN 3110 Financial Management I
  - 3 - LAW 3220 Legal Environment of Business
  - 3 - Elective
- 15

### Second Semester

- 3 - ACCT 3120 Intermediate Financial Acct. II
  - 3 - FIN 3050 Investment Analysis
  - 3 - FIN 3070 Principles of Real Estate
  - 3 - FIN 3120 Financial Management II
  - 3 - Elective
- 15

## Senior Year

### First Semester

- 3 - ACCT 3030 Cost Accounting
  - 3 - ACCT 3130 Intermediate Financial Acct. III
  - 3 - FIN 3080 Financial Institutions and Markets
  - 6 - Emphasis Area Requirement<sup>4</sup>
- 15

### Second Semester

- 3 - MGT 4150 Business Strategy<sup>3</sup>
  - 9 - Emphasis Area Requirement<sup>4</sup>
  - 3 - Elective
- 15

121 Total Semester Hours

<sup>1</sup>See General Education Requirements. *Note:* Cross-Cultural Awareness Requirement may also be satisfied by some of these courses

<sup>2</sup>If this requirement is met through the completion of another General Education requirement, students will have three additional elective hours. Students must complete 121 hours total.

<sup>3</sup>MGT 4150 must be taken at Clemson University.

<sup>4</sup>Fifteen credit hours from one of the following emphasis areas are required. Emphasis area should be selected before the end of the junior year in consultation with the advisor:

*Corporate Finance*—FIN 4020, 4040, 4110; plus two courses from FIN 3040, 4050, 4060, or 4080. Completion of three hours of FIN 3990 or 4980 may substitute for one of FIN 3040, 4050, 4060, or 4080. One accounting course may substitute for FIN 3040, 4050, 4060, or 4080. Accounting courses may be selected from any 3000- or 4000-level courses offered by the School of Accountancy which are not already specifically required.

*Financial Planning*—ACCT 4040, 4080, FIN 3040, 4050, 4090

*Financial Services*—FIN 4050, 4060, 4080, 4110, and one course from FIN 3040, 3990 (three credits), 4170, 4980 (three credits)

*Real Estate*—FIN 4150, 4160, 4170, LAW 3330, plus one course from FIN 3990 (three credits), 4080, 4980 (three credits) LAW 4050

#### Notes:

1. Financial Management majors are required to have a minimum grade-point average of 2.0 in all FIN-designated courses to graduate. Only the last grade for courses that are repeated is used in computing this grade-point average.
2. At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

## GRAPHIC COMMUNICATIONS

### Bachelor of Science

The Bachelor of Science degree in Graphic Communications prepares students for professional careers in printing, publishing, packaging, and related industries. The core curriculum assures graduates of having the skills and knowledge required by most entry-level jobs. The major requirements allow each student to select courses that enhance career preparation in specific segments of graphic communications. Coursework is heavily oriented around individual laboratory performance, which stresses the development of problem-solving skills in a broad cross-section of manufacturing areas. Applications include all major processes and a variety of industry segments, including commercial printing, publishing, package production, specialty printing, and industrial applications of printing technology beyond communications. The most common career opportunities are in printing management, production planning and supervision, and commercial and technical sales.

The Graphic Communications program is designed to be completed in four years (eight semesters and one or two summers). While students must take one internship during a fall or spring semester, one or two summers are typically used to make up for that semester. The department schedules courses in summers for that purpose. Taking a reduced load per term or other circumstances could extend the time needed to meet graduation requirements.

### Policy on Advancement in Graphic Communications

Graphic Communications majors must earn a C or better in prerequisite GC courses before enrolling in the next level GC course. Registration priority is given to those students for whom the course is a requirement.

### Change of Major into Graphic Communications

Students who change majors into Graphic Communications must have completed at least 12 credit hours at Clemson, must have a 2.0 minimum cumulative grade-point average, and must have earned a B or better in GC 1020.

## Freshman Year

### First Semester

- 1 - GC 1010 Orientation to Graphic Comm.
  - 4 - GC 1020 Foundations in Graphic Comm.
  - 3 - PSYC 2010 Introduction to Psychology
  - 4 - Approved Laboratory Science Requirement<sup>1</sup>
  - 3 - Major Requirement<sup>2</sup>
- 15

### Second Semester

- 3 - ENGL 1030 Accelerated Composition
  - 4 - GC 1040 Graphic Communications I
  - 3 - STAT 2300 Statistical Methods I *or*  
3 - STAT 3090 Intro. Business Statistics *or*  
3 - STAT 3300 Statistical Methods II
  - 4 - Approved Laboratory Science Requirement<sup>1</sup>
  - 1 - Elective
- 15

## Sophomore Year

### First Semester

- 3 - ACCT 2010 Financial Accounting Concepts
  - 4 - GC 2070 Graphic Communications II
  - 3 - MGT 2010 Principles of Management
  - 2 - PKGS 1020 Intro. to Packaging Science
  - 3 - Arts and Humanities (Literature) Requirement<sup>4</sup>
- 15

### Second Semester

- 3 - ACCT 2020 Managerial Accounting Concepts
  - 3 - ECON 2000 Economic Concepts *or*  
3 - ECON 2110 Principles of Microeconomics
  - 3 - ENSP 2000 Intro. to Environmental Science
  - 4 - GC 3400 Digital Imaging and eMedia
  - 3 - GC 4460 Ink and Substrates
- 16

### Summer

- 0 - COOP 2010 Cooperative Education<sup>5</sup>
  - 1 - GC 3500 Graphic Comm. Internship I<sup>5</sup>
- 1

## Junior Year

### First Semester

- 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
  - 4 - GC 4060 Package and Specialty Printing
  - 3 - MKT 3010 Principles of Marketing
  - 6 - Major Requirement<sup>2</sup>
- 16

### Second Semester

- 3 - ENGL 3140 Technical Writing
  - 4 - GC 4400 Commercial Printing
  - 3 - Major Requirement<sup>2</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>6</sup>
  - 3 - Elective
- 16

### Summer

- 0 - COOP 2020 Cooperative Education<sup>5</sup>
  - 1 - GC 4500 Graphic Comm. Internship II<sup>5</sup>
- 1

**Senior Year****First Semester**

- 4 - GC 4440 Current Dev. and Trends in GC
- 3 - MGT 3070 Human Resource Management *or*  
3 - PSYC 3640 Industrial Psychology
- 3 - Graphic Communication Technical Req.<sup>2</sup>
- 3 - Major Requirement<sup>2</sup>
- 2 - Elective
- 15

**Second Semester**

- 3 - GC 4480 Planning and Controlling Printing Functions
- 2 - GC 4800 Senior Seminar in Graphic Comm.
- 3 - Major Requirement<sup>2</sup>
- 4 - Elective
- 12

122 Total Semester Hours

<sup>1</sup>Must include four credit hours in chemistry (CH 1010 or 1050) and four credit hours in physics (PHYS 1220/1240 or 2070/2090).

<sup>2</sup>Must be approved prior to registration. See advisor.

<sup>3</sup>Students who wish to minor in Business Administration may not select STAT 2300.

<sup>4</sup>Select any ENGL course from General Education Arts and Humanities (Literature) Requirement.

<sup>5</sup>One internship must be in a fall or spring semester (summer—at least 12 weeks; fall/spring—at least 15 weeks). GC 4550 will not substitute for 4500.

<sup>6</sup>See General Education Requirements. This course or three elective credit hours must also satisfy the Cross-Cultural Awareness Requirement.

**MANAGEMENT****Bachelor of Science**

The Bachelor of Science degree in Management prepares students for careers as professional managers in corporations, governmental organizations, and small businesses. In addition, the program provides a foundation for graduates who wish to pursue advanced degrees in business and public administration, law, and the social sciences.

The curriculum gives students a broad exposure to the functional areas of business and allows each to select an emphasis area in a subject that is germane to individual career interests. The Management curriculum provides an examination of the social, legal, political, and economic environments in which organizations must operate; an understanding of the functional areas of business and their interrelationships; and a knowledge of behavioral science, applied statistics, and mathematics as they relate to organizational problem solving. The program is accredited by AACSB International.

Students wishing to change majors into the management program must have a 2.0 or higher Clemson/Bridge cumulative grade-point average.

**Combined Bachelor of Science/  
Master of Science Degree Program**

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements. Students may apply up to 12 hours of graduate credits to both the BS and MS degrees. To be eligible for this program, students must have a 3.4 or higher grade-point average, have completed at least 90 credits of coursework and have been admitted to

the Graduate School prior to registering for graduate courses. Students in this program are conditionally accepted to the graduate program until they have completed all BS degree requirements.

**Sophomore Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
- 3 - MGT 2010 Principles of Management<sup>1</sup>
- 3 - MGT 2180 Mgt. Personal Computer Appl.<sup>1</sup>
- 3 - STAT 3090 Introductory Business Statistics
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - ACCT 2020 Managerial Accounting Concepts
- 3 - MGT 3100 Intermediate Business Statistics<sup>1</sup>
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Cross Cultural Awareness Requirement<sup>2</sup>
- 3 - Elective
- 15

**Junior Year****First Semester**

- 3 - MGT 3180 Management of Info. Systems<sup>1</sup>
- 3 - MGT 3900 Operations Management<sup>1</sup>
- 3 - MKT 3010 Principles of Marketing
- 3 - Emphasis Area Requirement<sup>1,3</sup>
- 3 - Support Area Requirement<sup>4</sup>
- 15

**Second Semester**

- 3 - LAW 3220 Legal Environment of Business
- 3 - MGT 3070 Human Resource Management<sup>1</sup> *or*  
3 - MGT 4000 Mgt. of Organizational Behavior<sup>1</sup>
- 3 - MGT 3120 Decision Models for Management<sup>1</sup>
- 3 - Emphasis Area Requirement<sup>1,3</sup>
- 3 - Support Area Requirement<sup>4</sup>
- 15

**Senior Year****First Semester**

- 3 - FIN 3060 Corporation Finance *or*  
3 - FIN 3110 Financial Management I
- 3 - Emphasis Area Requirement<sup>1,3</sup>
- 6 - Support Area Requirement<sup>4</sup>
- 3 - Elective
- 15

**Second Semester**

- 3 - MGT 4150 Business Strategy<sup>1,5</sup>
- 3 - MGT 4230 International Business Management<sup>1</sup>
- 3 - Emphasis Area Requirement<sup>1,3</sup>
- 3 - Support Area Requirement<sup>4</sup>
- 3 - Elective
- 15

120 Total Semester Hours

<sup>1</sup>Grade of C or better in this course is required for graduation.

<sup>2</sup>See General Education Requirements. If this requirement is met through the completion of another General Education requirement, students will have three additional elective hours. Students must complete 120 total hours. *Note:* Cross-Cultural Awareness Requirement may also be satisfied by some of these courses.

<sup>3</sup>Management majors must complete an emphasis area consisting of twelve hours beyond the coursework required by the management curriculum and the support area requirement. Students should choose ONE of the following ways to satisfy this requirement:

*Entrepreneurship*—ELE 3010, MGT (ELE) 3150 plus two courses from ECON (ELE) 3210, ELE 4010, 4990, MGT 4400, 4970, MKT (ELE) 3140, MKT 4200, 4250, 4260, 4270, 4280, 4290, 4300, SOC (ELE), POSC, PSYC) 3560.

*Human Resource Management*—Any four of the following courses, including at least two management courses not already taken in the basic curriculum: MGT 3070, 4000, 4160, 4250, 4310, 4350, 4360, 4400, PSYC 3640, 3680, 4350, 4710.

*International Management*—Any four of the following courses: ECON 3100, FIN 4110, LAW 4200, MGT 4240, 4440, MKT 4270, POSC 3610, 3620, 3670, 4290, and any international business courses approved in advance and taken as part of a study abroad experience.

*Management Information Systems*—MGT 4110, 4520; and two courses from CPSC 4620, MGT 4300 (topic must be approved in advance by advisor), 4540, 4550, 4560.

*Operations Management*—MGT 4020; and two courses from MGT 4080, 4110, 4270; and one course from MGT 4040, 4120, 4440.

*Supply Chain Management*—MGT 4120, 4240; and two courses from MGT 3050, 3170, 4020, 4080, 4270, 4440, MKT 4260.

*General Management*—Any four 3000- or 4000-level management courses.

<sup>4</sup>Management majors must complete a support area consisting of fifteen hours beyond the coursework required by the management curriculum and the management emphasis area requirement. Students should choose ONE of the following two ways to satisfy this requirement: (1) Declare and complete a minor requiring AT LEAST 15 hours of additional coursework; or (2) Complete 15 hours of coursework selected from the approved list of management support courses.

<sup>5</sup>MGT 4150 must be taken at Clemson University.

*Note:* At least 50 percent of the total credits taken in ACCT, ECON, ELE, FIN, LAW, MGT, and MKT must be taken at Clemson University.

**MARKETING****Bachelor of Science**

The Bachelor of Science degree program in Marketing develops an understanding of various aspects of marketing. The curriculum prepares students for professional marketing careers in industry, government, or the nonprofit sector. Graduates are also well prepared for entrance into the Master of Business Administration, law, or other graduate programs. For students who want a general perspective of marketing, the curriculum provides a broad range of subjects with the flexibility to tailor courses by choosing areas that enhance career preparation in various areas of marketing. Subjects include promotional strategy, professional selling, sales management, public and nonprofit marketing, entrepreneurship, marketing research, product management, marketing management, and international marketing. The Marketing curriculum provides the conceptual, quantitative, and analytical skills necessary to function in a dynamic business environment. The Marketing degree is accredited by AACSB International.

Students wishing to change majors into the Marketing program must have a Clemson/Bridge cumulative grade-point average of 3.0 or higher. Students must also have completed the Pre-Business Program.

**Sophomore Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
- 3 - CPSC 2200 Microcomputer Applications *or*  
3 - MGT 2180 Personal Computer Applications
- 3 - MGT 2010 Principles of Management
- 3 - STAT 3090 Introductory Business Statistics
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - ACCT 2020 Managerial Accounting Concepts
- 3 - MGT 3100 Intermediate Business Statistics
- 3 - MKT 3010 Principles of Marketing
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Cross-Cultural Awareness Requirement<sup>1</sup>

15

**Junior Year****First Semester**

- 3 - ENGL 3040 Business Writing
- 3 - LAW 3220 Legal Environment of Business
- 3 - MKT 3020 Consumer Behavior
- 3 - MKT 4310 Marketing Research<sup>2</sup>
- 3 - Support Course Requirement<sup>3</sup>

15

**Second Semester**

- 3 - FIN 3060 Corporation Finance
- 3 - MKT 4200 Professional Selling
- 3 - Marketing Requirement<sup>4</sup>
- 3 - Support Course Requirement<sup>3</sup>
- 4 - Elective

16

**Senior Year****First Semester**

- 3 - MGT 4150 Business Strategy<sup>2</sup>
- 3 - MKT 4270 International Marketing
- 3 - Marketing Requirement<sup>4</sup>
- 3 - Support Course Requirement<sup>3</sup>
- 3 - Elective

15

**Second Semester**

- 3 - MKT 4500 Strategic Marketing Management<sup>2</sup>
- 3 - Marketing Requirement<sup>4</sup>
- 6 - Support Course Requirement<sup>3</sup>
- 3 - Elective

15

121 Total Semester Hours

<sup>1</sup>See General Education Requirements. *Note:* Cross-Cultural Awareness Requirement may also be satisfied by some of these courses.

<sup>2</sup>Must be taken at Clemson University.

<sup>3</sup>Chosen jointly by the student and the advisor. Certain minors may be used to satisfy the Support Courses Requirement. A maximum of six hours can be from MKT 2980, 3980, 3990, 4980, and 4990. See advisor.

<sup>4</sup>Select from any MKT 3000 and 4000 level content courses. A maximum of three hours may be from MKT 3980, 3990, 4980, and 4990 to satisfy Marketing Emphasis area requirements.

*Note:* At least 50 percent of the total credits taken in ACCT, ECON, FIN, LAW, MGT, and MKT must be taken at Clemson University.

**POLITICAL SCIENCE**

The Department of Political Science offers two degree programs: a Bachelor of Arts and a Bachelor of Science, requiring 120–121 credit hours. Both prepare students for a wide range of graduate programs and career opportunities. The Bachelor of Arts program provides broad coverage of the political science discipline and emphasizes communication skills and humanities. The Bachelor of Science program is recommended for those with an aptitude for mathematics and/or an interest in political economy, public administration, public policy, or other fields requiring advanced quantitative skills. Both programs are appropriate for pre-law students and for students

interested in either American or global politics. Note that the Bachelor of Arts degree requires a minor, and the Bachelor of Science degree requires a field of concentration and, depending on the concentration, requires or allows a minor.

**Bachelor of Arts**

The requirements for a Bachelor of Arts degree in Political Science consist of POSC 1010, 1020 or 1040, 1030, 1990, 4990, and at least 24 additional credit hours in political science at the 3000–4000 level, including at least one course from each of the following fields:

**American Government**—POSC 4030, 4050, 4160, 4360, 4420

**Comparative Politics**—POSC 3710, 3720, 4660, 4710, 4760, 4770, 4780

**International Relations**—POSC 3610, 3620, 3630, 3750, 4290, 4480

**Political Theory**—POSC 4490, 4500, 4530, 4550

**Public Policy and Public Administration**—POSC 3020, 3210, 4210, 4230, 4240, 4270, 4300

The student's additional coursework in political science is chosen with the consent and advice of the departmental advisor to ensure an appropriate balance of breadth and specialization within the field of political science. In addition to the courses listed above, the department offers a wide range of specialized courses in each of the subfields of the political science discipline.

The Bachelor of Arts degree in Political Science also requires additional arts and humanities courses beyond the basic General Education Requirements.

*Note:* No more than three hours credit from POSC 3050, 3100, 3110, 3120, 3130, 4090, and 4100 may be applied toward a Political Science major.

**Freshman Year****First Semester**

- 3 - POSC 1010 American National Government
- 1 - POSC 1990 Introduction to Political Science
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - History Requirement<sup>2</sup>
- 3 - Mathematics Requirement<sup>3</sup>
- 1 - Elective

14

**Second Semester**

- 3 - ENGL 1030 Accelerated Composition
- 3 - POSC 1020 Intro. to International Relations *or*
- 3 - POSC 1040 Intro. to Comparative Politics
- 3 - POSC 1030 Introduction to Political Theory
- 3 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>3</sup>

16

**Sophomore Year****First Semester**

- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Major Requirement<sup>4</sup>
- 3 - Mathematics or Natural Science Requirement<sup>3</sup>
- 3 - Oral Communication Requirement<sup>3</sup>
- 3 - Elective

15

**Second Semester**

- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
- 3 - History Requirement<sup>2</sup>
- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>

15

**Junior Year****First Semester**

- 3 - ECON 2110 Principles of Microeconomics
- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>
- 3 - Science and Tech. in Society Requirement<sup>3</sup>
- 3 - Elective

15

**Second Semester**

- 3 - ECON 2120 Principles of Macroeconomics
- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>
- 6 - Elective

15

**Senior Year****First Semester**

- 1 - POSC 4990 Professional Dev. in Political Sci.
- 3 - Fine Arts Requirement<sup>6</sup>
- 6 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>
- 2 - Elective

15

**Second Semester**

- 6 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>5</sup>
- 6 - Elective

15

120 Total Semester Hours

<sup>1</sup>Six hours (through 2020) in the same modern foreign language are required.

<sup>2</sup>HIST 1010, 1020, 1720, 1730, 1930

<sup>3</sup>See General Education Requirements.

<sup>4</sup>See major requirements in program description above.

<sup>5</sup>See list of approved minors on page 92.

<sup>6</sup>Any course in AAH, ART, MUSC, or THEA not already used to satisfy a General Education Requirement.

**POLITICAL SCIENCE****Bachelor of Science**

The requirements for a Bachelor of Science degree in Political Science consist of POSC 1010, 1020 or 1040, 1030, 1990, 3410, 4990, and at least 21 additional credit hours in political science at the 3000–4000 level, including one upper-level American politics course and one upper-level global politics course.

In consultation with the departmental advisor, students choose one of the following concentrations: American Politics, Global Politics, Political Economy, Public Administration, or Public Policy.

*Note:* No more than three hours credit from POSC 3050, 3100, 3110, 3120, 3130, 4090, and 4100 may be applied toward a Political Science major.

**Freshman Year****First Semester**

3 - POSC 1010 American National Government  
 1 - POSC 1990 Introduction to Political Science  
 3 - Foreign Language Requirement<sup>1</sup>  
 3 - Mathematics Requirement<sup>2</sup>  
 4 - Natural Science Requirement<sup>3</sup>  
 14

**Second Semester**

3 - ENGL 1030 Accelerated Composition  
 3 - POSC 1020 Intro. to International Relations *or*  
 3 - POSC 1040 Intro. to Comparative Politics  
 3 - POSC 1030 Introduction to Political Theory  
 3 - Foreign Language Requirement<sup>1</sup>  
 4 - Natural Science Requirement<sup>3</sup>  
 16

**Sophomore Year****First Semester**

3 - ECON 2110 Principles of Microeconomics  
 3 - American Politics Requirement<sup>4</sup>  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>5</sup>  
 3 - Mathematics Requirement<sup>2</sup>  
 3 - Philosophy of Science Requirement<sup>6</sup>  
 15

**Second Semester**

3 - ECON 2120 Principles of Macroeconomics  
 3 - Advanced Political Science Requirement<sup>7</sup>  
 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>  
 3 - Global Politics Requirement<sup>8</sup>  
 3 - Mathematics Requirement<sup>2</sup>  
 15

**AMERICAN POLITICS  
CONCENTRATION****Junior Year****First Semester**

3 - POSC 3410 Quantitative Methods in Pol. Sci.  
 3 - American Politics Requirement<sup>4</sup>  
 3 - Oral Communication Requirement<sup>5</sup>  
 6 - Elective  
 15

**Second Semester**

3 - American Politics Requirement<sup>4</sup>  
 3 - Minor Requirement<sup>9</sup>  
 3 - Science and Tech. in Society Requirement<sup>5</sup>  
 7 - Elective  
 16

**Senior Year****First Semester**

1 - POSC 4990 Professional Dev. in Political Sci.  
 3 - American Politics Requirement<sup>4</sup>  
 6 - Minor Requirement<sup>9</sup>  
 5 - Elective  
 15

**Second Semester**

3 - American Politics Requirement<sup>4</sup>  
 6 - Minor Requirement<sup>9</sup>  
 6 - Elective  
 15  
 121 Total Semester Hours

**GLOBAL POLITICS  
CONCENTRATION****Junior Year****First Semester**

3 - POSC 3410 Quantitative Methods in Pol. Sci.  
 3 - Global Politics Requirement<sup>8</sup>  
 3 - Oral Communication Requirement<sup>5</sup>  
 6 - Elective  
 15

**Second Semester**

3 - Global Politics Requirement<sup>8</sup>  
 3 - Minor Requirement<sup>9</sup>  
 3 - Science and Tech. in Society Requirement<sup>5</sup>  
 7 - Elective  
 16

**Senior Year****First Semester**

1 - POSC 4990 Professional Dev. in Political Sci.  
 3 - Global Politics Requirement<sup>8</sup>  
 6 - Minor Requirement<sup>9</sup>  
 5 - Elective  
 15

**Second Semester**

3 - Global Politics Requirement<sup>8</sup>  
 6 - Minor Requirement<sup>9</sup>  
 6 - Elective  
 15  
 121 Total Semester Hours

**POLITICAL ECONOMY  
CONCENTRATION****Junior Year****First Semester**

3 - ECON 3140 Intermediate Microeconomics  
 3 - POSC 3410 Quantitative Methods in Pol. Sci.  
 3 - Oral Communication Requirement<sup>5</sup>  
 6 - Elective  
 15

**Second Semester**

3 - ECON 3500 Moral and Ethical Aspects of a  
 Market Economy  
 3 - POSC 4480 International Political Economy  
 3 - Science and Tech. in Society Requirement<sup>5</sup>  
 7 - Elective  
 16

**Senior Year****First Semester**

3 - POSC 4490 Political Theory of Capitalism  
 1 - POSC 4990 Professional Dev. in Political Sci.  
 3 - Advanced Political Science Requirement<sup>7</sup>  
 3 - Economics Requirement<sup>10</sup>  
 5 - Elective  
 15

**Second Semester**

3 - ECON 3600 Public Choice  
 3 - Advanced Political Science Requirement<sup>7</sup>  
 3 - Economics Requirement<sup>10</sup>  
 6 - Elective  
 15  
 121 Total Semester Hours

**PUBLIC ADMINISTRATION  
CONCENTRATION****Junior Year****First Semester**

3 - POSC 3210 Public Administration  
 3 - POSC 3410 Quantitative Methods in Pol. Sci.  
 3 - Oral Communication Requirement<sup>5</sup>  
 6 - Elective  
 15

**Second Semester**

3 - Advanced Political Science Requirement<sup>7</sup>  
 6 - Public Administration Requirement<sup>11</sup>  
 3 - Science and Tech. in Society Requirement<sup>5</sup>  
 4 - Elective  
 16

**Senior Year****First Semester**

3 - POSC 4210 Public Policy  
 1 - POSC 4990 Professional Dev. in Political Sci.  
 6 - Public Administration Requirement<sup>11</sup>  
 5 - Elective  
 15

**Second Semester**

3 - Policy/Administration Requirement<sup>12</sup>  
 6 - Public Administration Requirement<sup>11</sup>  
 6 - Elective  
 15  
 121 Total Semester Hours

**PUBLIC POLICY  
CONCENTRATION****Junior Year****First Semester**

3 - POSC 3410 Quantitative Methods in Pol. Sci.  
 3 - POSC 4210 Public Policy  
 3 - Oral Communication Requirement<sup>5</sup>  
 6 - Elective  
 15

**Second Semester**

3 - Advanced Political Science Requirement<sup>7</sup>  
 6 - Public Policy Requirement<sup>11</sup>  
 3 - Science and Tech. in Society Requirement<sup>5</sup>  
 4 - Elective  
 16

**Senior Year****First Semester**

3 - POSC 3210 Public Administration  
 1 - POSC 4990 Professional Dev. in Political Sci.  
 6 - Public Policy Requirement<sup>11</sup>  
 5 - Elective  
 15

**Second Semester**

3 - Policy/Administration Requirement<sup>12</sup>  
 6 - Public Policy Requirement<sup>11</sup>  
 6 - Elective  
 15  
 121 Total Semester Hours

<sup>1</sup>Six hours (through 2020) in the same modern foreign language are required.

<sup>2</sup>MATH 1020 or 1060; MATH 1080 or 2070; STAT 2300 or 3090.

<sup>3</sup>See General Education Requirements. A two-semester sequence in the same science is required.



<sup>4</sup>POSC 3020, 3210, 3430, 3810, 4030, 4050, 4070, 4090, 4160, 4210, 4230, 4240, 4270, 4300, 4360, 4370, 4380, 4420, 4530, 4540, 4550, 4610, 4800, or 4820

<sup>5</sup>See University General Education Requirements. (Note: Arts and Humanities (Non-Literature) Requirement must be satisfied by a course in PHIL or REL)

<sup>6</sup>PHIL 1020, 2250, 3230, 3250, or 3270

<sup>7</sup>Any 3000- or 4000-level POSC course

<sup>8</sup>POSC 3610, 3620, 3630, 3670, 3710, 3720, 3750, 4100, 4280, 4290, 4480, 4560, 4570, 4590, 4660, 4710, 4720, 4730, 4760, 4770, 4780, or (LANG) 4850

<sup>9</sup>See list of approved minors on page 92.

<sup>10</sup>ECON 3010, 3020, 3090, 3100, 3150, 3190, 4020, 4040, 4100, 4120, 4130, 4190, 4200, 4220, 4250, 4270, 4280, 4400 or HIST 3250, 3270.

<sup>11</sup>See advisor.

<sup>12</sup>POSC 3020, 4240, 4270, or 4300

## PSYCHOLOGY

Psychology is the study of human and animal behavior and the biological, psychological, and social processes related to that behavior. The Bachelor's degree in Psychology prepares students for a variety of professional careers related to human resources, personnel, counseling, and other people-oriented positions in human services, business, and industry. Additionally, the Bachelor's degree provides excellent preparation for graduate training in such areas as clinical, counseling, industrial, experimental, cognitive, social, biological, health, developmental, and school psychology. The program also provides excellent preparation for students who intend to pursue professional training in medicine, physical or occupational therapy, dentistry, pharmacy, veterinary science, or law. Further information is available at [www.clemson.edu/psych/](http://www.clemson.edu/psych/).

### Change of Major into Psychology

Students who change majors into Psychology must have completed at least 12 credit hours at Clemson or in the Bridge Program and must have a 2.4 minimum Clemson/Bridge cumulative grade-point average.

### Bachelor of Arts

The Bachelor of Arts program requires PSYC 2010, 2020, 3090, 3100, 4920, and 19 additional credits selected from PSYC 2750 and/or 3000-4000-level psychology courses arranged as follows:

Two courses from the **Biological and Cognitive** menu: PSYC 3240, 3330, 4220

One course from each of the following menus:

**Applied**—PSYC 2750, 3640, 3680, 3830, 4350, 4560, 4800, 4880

**Individuals and Groups**—PSYC 3400, 3520, 3700  
**Laboratory/Research**—PSYC 3250, 3340, 4230, 4560, 4710, 4900, 4930, 4950, 4970, 4980

At least six credits must be from 4000-level psychology courses, with at least three of those credits from psychology courses numbered between 4000 and 4890. BIOL 4700 may be taken in lieu of one elective psychology course. Students satisfying both the Applied and Laboratory requirements with PSYC 4560 must still satisfy the requirement for 19 additional credits in Psychology (see above). Students should consult their advisors for other degree requirements and course recommendations.

## Freshman Year

### First Semester

- 3 - PSYC 2010 Introduction to Psychology
- 1 - PSYC 2020 Introductory Psychology Lab.
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Mathematics Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>3</sup>
- 1 - Elective
- 14

### Second Semester

- 3 - ENGL 1030 Accelerated Composition
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Major Requirement<sup>4</sup>
- 4 - Natural Science with Lab Requirement<sup>2</sup>
- 16

## Sophomore Year

### First Semester

- 4 - PSYC 3090 Introductory Experimental Psych.
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Cross-Cultural Awareness Requirement<sup>2</sup>
- 2 - Mathematics or Natural Science Requirement<sup>2</sup>
- 2 - Elective
- 15

### Second Semester

- 4 - PSYC 3100 Advanced Experimental Psych.
- 3 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Major Requirement<sup>4</sup>
- 5 - Elective
- 15

## Junior Year

### First Semester

- 4 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>6</sup>
- 3 - Science and Tech. in Society Requirement<sup>2</sup>
- 5 - Elective
- 15

### Second Semester

- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>6</sup>
- 3 - Oral Communication Requirement<sup>2</sup>
- 6 - Elective
- 15

## Senior Year

### First Semester

- 1 - PSYC 4920 Senior Laboratory in Psychology
- 3 - Major Requirement<sup>4</sup>
- 3 - Minor Requirement<sup>6</sup>
- 8 - Elective
- 15

### Second Semester

- 3 - Major Requirement<sup>4</sup>
- 6 - Minor Requirement<sup>6</sup>
- 6 - Elective
- 15

120 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language are required.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>See General Education Requirements. Social Science Requirement must be in an area other than psychology.

<sup>4</sup>See major requirements in program description above.

<sup>5</sup>Three credit hours, in addition to the Mathematics and Natural Science General Education Requirements, are required. Select any mathematics course that satisfies the General Education Requirement, any MATH or STAT course at the 3000-level or higher, any natural or physical science course on the departmental list of acceptable courses, or any relevant course with the approval of the Psychology Department Chair.

<sup>6</sup>Select any minor listed on page 92.

## PSYCHOLOGY

### Bachelor of Science

The Bachelor of Science program in Psychology requires PSYC 2010, 2020, 3090, 3100, 4920, and 19 additional credits selected from PSYC 2750 and/or 3000-4000-level psychology courses arranged as follows:

At least six credits from the **Biological and Cognitive** menu: PSYC 3240, 3330, 4220

At least three credits from each of the following menus:

**Applied**—PSYC 2750, 3640, 3680, 3830, 4350, 4560, 4800, 4880

**Foundations of Science**—GW 4020, PHIL 3260, 3270, PSYC 4150

**Individuals and Groups**—PSYC 3400, 3520, 3700

At least one credit from the **Laboratory/Research** menu—PSYC 3250, 3340, 4230, 4560, 4710, 4900, 4930, 4950, 4970, 4980

At least six credits must be from 4000-level psychology courses, with at least three of those credits from psychology courses numbered between 4000 and 4890. BIOL 4700 may be taken in lieu of one elective psychology course. Students satisfying both the Applied and Laboratory/Research requirements with PSYC 4560 must still satisfy the requirement for 19 additional credits in Psychology (see above). Students should consult their advisors for other degree requirements and course recommendations.

## Freshman Year

### First Semester

- 3 - PHIL 1020 Introduction to Logic
- 3 - PSYC 2010 Introduction to Psychology
- 1 - PSYC 2020 Introductory Psychology Lab.
- 3 - Mathematics Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>1</sup>
- 14

### Second Semester

- 3 - ENGL 1030 Accelerated Composition
- 4 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Major Requirement<sup>3</sup>
- 3 - Mathematics or Natural Science Requirement<sup>1</sup>
- 3 - Elective
- 16

## Sophomore Year

### First Semester

- 4 - PSYC 3090 Introductory Experimental Psych.
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 4 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Social Science Requirement<sup>4</sup>
- 14

**Second Semester**

- 4 - PSYC 3100 Advanced Experimental Psychology
  - 3 - Cross-Cultural Awareness Requirement<sup>1</sup>
  - 3 - Departmental Math. or Science Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>4</sup>
  - 3 - Elective
- 
- 16

**Junior Year****First Semester**

- 3 - Departmental Math. or Science Requirement<sup>2</sup>
  - 3 - Major Requirement<sup>3</sup>
  - 3 - Minor Requirement<sup>5</sup>
  - 3 - Science and Tech. in Society Requirement<sup>1</sup>
  - 3 - Elective
- 
- 15

**Second Semester**

- 2 - Departmental Math. or Science Requirement<sup>2</sup>
  - 4 - Major Requirement<sup>3</sup>
  - 3 - Minor Requirement<sup>5</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
  - 3 - Elective
- 
- 15

**Senior Year****First Semester**

- 1 - PSYC 4920 Senior Laboratory in Psychology
  - 6 - Major Requirement<sup>3</sup>
  - 3 - Minor Requirement<sup>5</sup>
  - 5 - Elective
- 
- 15

**Second Semester**

- 3 - Major Requirement<sup>3</sup>
  - 6 - Minor Requirement<sup>5</sup>
  - 6 - Elective
- 
- 15

120 Total Semester Hours

<sup>1</sup>See General Education Requirements.

<sup>2</sup>Sixteen credit hours, in addition to the Mathematics and Natural Science Requirements, are required. Select from any natural or physical science courses, any mathematics courses that satisfy the General Education Requirement or any MATH or STAT courses at the 3000-level or higher.

<sup>3</sup>See major requirements in program description above.

<sup>4</sup>See General Education Requirements. PSYC 2010 and two additional non-psychology social science courses (from the same or different fields) satisfy General Education and departmental requirements.

<sup>5</sup>Select any minor listed on page 92.

**SOCIOLOGY**

The Sociology major offers two degree programs: a Bachelor of Arts and a Bachelor of Science. Both degrees prepare students for a variety of professional careers related to human resources, management, public relations, social services, criminal justice, health services, social research, and other people-oriented positions in the public and private sector. In addition, the Bachelor's degree provides excellent preparation for graduate training in sociology, anthropology, social services, law, and business. Both degrees require a total of 121 semester hours, including 36 credit hours in sociology and/or anthropology, as identified below. Courses used to fulfill General Education Requirements may be used to fulfill minor requirements.

**Change of Major into Sociology**

Students who change majors into Sociology must have completed at least 12 credit hours at Clemson and must have a 2.0 minimum Clemson/Bridge cumulative grade-point average.

**Emphasis Areas in Sociology**

**Community Studies**—RS (SOC) 4590, SOC 3310, (RS) 4950; and six credits from all courses offered in anthropology or sociology not already taken to fulfill requirements.

**Criminal Justice**—SOC 3880, 3890; and nine credits selected from SOC 3910, 3920, 3960, 3980, 4680, 4860, 4910, 4930, 4940; and ANTH 3530. No more than three hours of SOC 4860 may be taken to satisfy concentration electives.

**General Sociology**—Nine credit hours selected from any courses offered in anthropology or sociology not already taken to fulfill requirements; three credit hours selected from SOC 3110, 3300, 4320, and 4440; and three credit hours selected from SOC 3500, 3510, 3910, and 4330.

**Social Services**—SOC 3800, 4140, (RS) 4950; and six credits from all courses offered in anthropology or sociology not already taken to fulfill requirements.

At least 12 of the total credits must be from 4000-level sociology, rural sociology, and/or anthropology courses; no more than nine credit hours may be taken in courses at the 1000 or 2000 level, except with approval of the department chair. Additional electives are added to meet the minimum of 121 hours required for graduation.

**Bachelor of Arts****Freshman Year****First Semester**

- 3 - MATH 1010 Essential Math. for Informed Soc. or
  - 3 - MATH 1020 Intro. to Mathemat. Analysis or
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - SOC 2010 Introduction to Sociology or
  - 3 - SOC 2020 Social Problems
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
  - 3 - Elective
- 
- 16-17

**Second Semester**

- 3 - ENGL 1030 Accelerated Composition
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 3 - Elective
- 
- 15

**Sophomore Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. or
  - 3 - COMM 2500 Public Speaking
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Cross-Cultural Awareness Requirement<sup>2</sup>
  - 6 - Elective
- 
- 15

**Second Semester**

- 1 - SOC 2050 Sociology Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 6 - Minor Requirement<sup>3</sup>
  - 3 - Science and Tech. in Society Requirement<sup>2</sup>
  - 3 - Elective
- 
- 16

**Junior Year****First Semester**

- 3 - ENGL 3040 Business Writing or
  - 3 - ENGL 3120 Advanced Composition or
  - 3 - ENGL 3140 Technical Writing or
  - 3 - ENGL 3160 Writing and International Trade
  - 3 - SOC 3020 Social Research Methods I
  - 3 - SOC 3600 Social Class and Poverty or
  - 3 - SOC 4600 Race and Ethnicity or
  - 3 - SOC 4610 Sociology of Sex and Gender
  - 3 - Advanced Humanities Requirement<sup>4</sup>
  - 3 - Emphasis Area Requirement<sup>5</sup>
- 
- 15

**Second Semester**

- 4 - SOC 3040 Social Research Methods II
  - 3 - Advanced Humanities Requirement<sup>4</sup>
  - 3 - Emphasis Area Requirement<sup>5</sup>
  - 6 - Minor Requirement<sup>3</sup>
- 
- 16

**Senior Year****First Semester**

- 3 - SOC 3600 Social Class and Poverty or
  - 3 - SOC 4600 Race and Ethnicity or
  - 3 - SOC 4610 Sociology of Sex and Gender
  - 3 - Advanced Humanities Requirement<sup>4</sup>
  - 6 - Emphasis Area Requirement<sup>5</sup>
  - 3 - Elective
- 
- 15

**Second Semester**

- 3 - SOC 4040 Sociological Theory
  - 1 - SOC 4970 Sociology Senior Lab.
  - 3 - Advanced Humanities Requirement<sup>4</sup>
  - 3 - Emphasis Area Requirement<sup>5</sup>
  - 3 - Minor Requirement<sup>3</sup>
- 
- 13

121-122 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language are required.

<sup>2</sup>See General Education Requirements. (Note: Social Science Requirement must be in an area other than sociology.)

<sup>3</sup>See page 92 for approved minors.

<sup>4</sup>Humanities courses numbered 3000 or higher (AAH 2100, MUSC 2100, THEA 2100 are accepted). The humanities for this purpose include art and architectural history, communication studies (except 3640 and 3680), English (except 3040, 3120, 3140, 3160, 3330, 3340, 3350, 4850, 4900, 4950), languages, music, philosophy, religion, theatre (except 3770, 4870, 4970), and women's studies, as well as courses entitled Humanities.

<sup>5</sup>See emphasis area requirements in program description above.

**SOCIOLOGY****Bachelor of Science****Freshman Year****First Semester**

- 3 - MATH 1010 Essential Math. for Informed Soc. *or*  
 3 - MATH 1020 Intro. to Mathemat. Analysis *or*  
 4 - MATH 1060 Calculus of One Variable I
- 3 - SOC 2010 Introduction to Sociology *or*  
 3 - SOC 2020 Social Problems
- 4 - Natural Science Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Elective
- 
- 16-17

**Second Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*  
 3 - COMM 2500 Public Speaking
- 3 - ENGL 1030 Accelerated Composition
- 3 - STAT 2300 Statistical Methods I
- 3 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Elective
- 
- 15

**Sophomore Year****First Semester**

- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Cross-Cultural Awareness Requirement<sup>1</sup>
- 3 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Minor Requirement<sup>3</sup>
- 3 - Elective
- 
- 15

**Second Semester**

- 1 - SOC 2050 Sociology Lab.
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Departmental Math. or Science Requirement<sup>2</sup>
- 6 - Minor Requirement<sup>3</sup>
- 3 - Science and Tech. in Society Requirement<sup>1</sup>
- 
- 16

**Junior Year****First Semester**

- 3 - SOC 3020 Social Research Methods I
- 3 - SOC 3600 Social Class and Poverty *or*  
 3 - SOC 4600 Race and Ethnicity *or*  
 3 - SOC 4610 Sociology of Sex and Gender
- 3 - Advanced Humanities Requirement<sup>4</sup>
- 3 - Advanced Writing Requirement<sup>5</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>
- 
- 15

**Second Semester**

- 4 - SOC 3040 Social Research Methods II
- 3 - Advanced Humanities Requirement<sup>4</sup>
- 3 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>
- 3 - Minor Requirement<sup>3</sup>
- 
- 16

**Senior Year****First Semester**

- 3 - SOC 3600 Social Class and Poverty *or*  
 3 - SOC 4600 Race and Ethnicity *or*  
 3 - SOC 4610 Sociology of Sex and Gender
- 6 - Departmental Math. or Science Requirement<sup>2</sup>
- 3 - Emphasis Area Requirement<sup>6</sup>
- 3 - Elective
- 
- 15

**Second Semester**

- 3 - SOC 4040 Sociological Theory
- 1 - SOC 4970 Sociology Senior Lab.
- 6 - Emphasis Area Requirement<sup>6</sup>
- 3 - Minor Requirement<sup>3</sup>
- 
- 13

## 121-122 Total Semester Hours

<sup>1</sup>See General Education Requirements. (Note: Social Science Requirement must be in an area other than sociology.)

<sup>2</sup>See advisor. At least nine of the 18 hours must be at the 3000 level or above.

<sup>3</sup>See page 92 for approved minors.

<sup>4</sup>Humanities courses numbered 3000 or higher (AAH 2100, MUSC 2100, THEA 2100 are accepted). The humanities for this purpose include art and architectural history, communication studies (except 3640 and 3680), English (except 3040, 3120, 3140, 3160, 3330, 3340, 3350, 4850, 4900, 4950), languages, music, philosophy, religion, theatre (except 3770, 4870, 4970), and women's studies, as well as courses entitled Humanities.

<sup>5</sup>ENGL 3040, 3120, 3140, or 3160

<sup>6</sup>See emphasis area requirements in program description above.

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## MINORS

Following are minors acceptable for students in the College of Business and Behavioral Science. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management
Adult/Extension Education	Management Information Systems— <i>not open to Management Majors</i>
Aerospace Studies	Mathematical Sciences
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Architecture	Nonprofit Leadership
Art	Packaging Science
Athletic Leadership— <i>not open to Marketing majors</i>	Pan African Studies
Biochemistry	Park and Protected Area Management
Biological Sciences	Philosophy
Business Administration— <i>not open to Accounting, BS Economics, Financial Management, Management, or Marketing majors</i>	Physics
Chemistry	Plant Pathology
Cluster	Political Science
Communication Studies	Psychology
Computer Science	Public Policy— <i>not open to Political Science majors</i>
Crop and Soil Environmental Science	Recreational Therapy
Digital Production Arts	Religion
East Asian Studies	Russian Area Studies
Economics	Science and Technology in Society
Education— <i>not open to Graphic Communications majors</i>	Screenwriting
English	Sociology
Entomology	Spanish-American Area Studies
Entrepreneurship— <i>not open to Accounting, BS Economics, Financial Management, Management, or Marketing majors</i>	Sustainability
Environmental Science and Policy	Theatre
Equine Industry	Travel and Tourism
Film Studies	Turfgrass
Financial Management	Urban Forestry
Food Science	Wildlife and Fisheries Biology
Forest Products	Women's Studies
Forest Resource Management	Writing
Genetics	
Geography	
Geology	
Global Politics— <i>not open to Political Science majors</i>	
Great Works	
History	
Horticulture	
Human Resources Management— <i>not open to Management majors</i>	
Legal Studies	

See pages 39-42 for details.

# COLLEGE OF ENGINEERING AND SCIENCE

The College of Engineering and Science offers a broad range of rigorous and stimulating baccalaureate programs that provide unexcelled educational opportunities. The innovative combination of engineering and science disciplines that comprises the College, facilitates study and research in fields transcending the traditional disciplines. Students enjoy close interaction with a distinguished faculty committed to excellence in undergraduate education, as well as in research. Additional information on the College and its programs is available at [www.clemson.edu/ces](http://www.clemson.edu/ces).

## Minors

Engineering and science students can complement their majors by selecting minor concentrations of study. Available minors include International Engineering and Science, and one in each of the science majors (see page 112).

## International Programs

The world economy has become very tightly integrated, making it highly important that engineering and science students prepare themselves for this global environment. The College offers a minor in International Engineering and Science coupled with several programs that provide opportunities for students to gain international experience. These include study abroad at many locations around the world and EPIC (an international co-op program). In addition, engineering and science students are encouraged to pursue study of a foreign language. A Certificate in International Engineering and Science, that combines language study and an international practicum, is also offered. Information is available in the Undergraduate Studies Office (107 Riggs Hall) and at [www.clemson.edu/ces/students/global](http://www.clemson.edu/ces/students/global).

## ENGINEERING PROGRAMS

The Bachelor of Science engineering degree programs in Bioengineering, Biosystems Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Industrial Engineering, Materials Science and Engineering (Inorganic Materials), and Mechanical Engineering are each accredited by the Engineering Accreditation Commission (EAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700. The new BS degree programs in Environmental Engineering and Materials Science and Engineering (Polymeric Materials) are designed to meet ABET requirements and will be submitted to ABET for accreditation review when eligible.

All engineering programs have the common goal of producing engineering graduates who are able to:

- apply knowledge of math, science, and engineering
- identify, formulate, and solve engineering problems
- design and conduct experiments and analyze data
- design systems or components to meet needs within realistic constraints
- function on multidisciplinary teams
- communicate effectively
- conduct themselves professionally and ethically
- understand engineering's global, economic, environmental, and societal context
- understand contemporary engineering issues
- apply modern engineering methods and tools
- appreciate the need for life-long learning

Each engineering program has objectives specific to the discipline. All prepare students for a wide range of career opportunities and provide sound preparation for graduate study. Each curriculum provides opportunities for students to pursue individual areas of interest.

## Admission Requirements

The University admission requirements are given under the section entitled *Admission*. Engineering applicants are strongly advised to include the following in their high school programs:

**Mathematics**—Four units, including geometry, trigonometry, and introductory calculus

**Laboratory Science**—At least three units, including both chemistry and physics

**Computing**—At least one unit, including introduction to a programming language. Applicants should have good keyboarding skills.

## General Engineering Program

All new engineering students (including transfer students who have not completed all courses in the freshman engineering curriculum) are admitted into General Engineering. The General Engineering Program provides students an opportunity to explore various engineering fields while getting a sound academic preparation for engineering study.

## Freshman Curriculum

### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - General Education Requirement<sup>1</sup>

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### Second Semester

- 1 - ENGR 1070 Programming and Problem Solving I<sup>2</sup>
- 1 - ENGR 1080 Programming and Problem Solving II<sup>2</sup>
- 1 - ENGR 1090 Programming and Problem Solving Applications<sup>2</sup>
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3-5 - Departmental Science or other Requirement(s)<sup>3</sup>
- 3 - General Education Requirement<sup>1</sup>

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<sup>1</sup>See Policy on General Education Requirements for Engineering Curricula below.

<sup>2</sup>Students who plan to pursue a Chemical Engineering degree should consult an advisor for requirements.

<sup>3</sup>See advisor for specific engineering major requirements.

## Admission into Engineering Degree Programs

To transfer into an engineering degree program, a student must have completed the following courses in the freshman engineering curriculum with a grade of C or better:

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I<sup>1</sup>
- 1 - ENGR 1060 Engineering Disciplines and Skills II<sup>1</sup>
- 1 - ENGR 1070 Programming and Problem Solving I<sup>1</sup>
- 1 - ENGR 1080 Programming and Problem Solving II<sup>1</sup>
- 1 - ENGR 1090 Programming and Problem Solving Applications<sup>1</sup>
- 4 - MATH 1060 Calculus of One Variable I
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I

<sup>1</sup>Chemical Engineering requirements vary; please see an advisor for details.

In addition, the student must have the minimum grade-point average specified by the engineering degree program for admission.

Students should initiate a change-of-major request prior to the registration period during the semester when they expect to complete the freshman curriculum. Students who fail to meet the requirements for admission into a degree program may remain in General Engineering until those requirements are met; however, General Engineering majors are not permitted to take 3000- or 4000-level engineering courses. Engineering departments may allow General Engineering majors to enroll in selected 2000-level engineering courses (policy varies by department). Students admitted into an engineering degree program will follow the curriculum in effect at the time of admission into General Engineering, unless otherwise approved by the specific engineering department.

## General Education Requirements for Engineering Curricula

Engineers have an obligation to practice their profession in a socially responsible manner. The education of engineers must prepare them for this responsibility and make them aware of the constraints imposed by societal and cultural factors. Thus, the humanities and social sciences are an important component of the engineering curricula. Further, the program of study must include educational experiences addressing the intersection of science and technology with society and cross-cultural awareness.

In addition to the University General Education Requirements, some engineering majors are required to complete additional credit hours from a college approved list. Individual engineering curricula may have more specific requirements. For a complete list of acceptable courses, please speak with an advisor.

## Electives for Engineering Curricula

Advisors must approve any course taken for elective credit in the Engineering curricula. Courses excluded for elective credit include PHYS 2000, 2070/2090, 2080/2100.

## Registration Requirements

A cumulative grade-point average of 2.0 or higher is required for registration in engineering courses numbered 3000 or higher. Priority for registration in engineering courses is given to those majors for whom the course is a degree requirement. Exceptions to this requirement may be granted by the department offering the course.

## Graduation Requirements

In addition to other institutional requirements, candidates for a baccalaureate degree in Engineering are required to have a 2.0 or higher cumulative grade-point average in all engineering courses taken at Clemson. All courses with "Engineering" in the course designator (e.g., ENGR 1300, ME 4530, etc.) are used in this calculation.

The baccalaureate programs in Engineering are designed to be completed in four years (eight regular semesters). Taking a reduced load or participating in cooperative education will extend this time. On average, Clemson engineering students take about four and one-half years to complete the requirements for graduation.

## BIOENGINEERING

### Bachelor of Science

The undergraduate program in Bioengineering is built upon a rigorous engineering science foundation that is, in turn, based upon a broad curriculum of applied and life sciences, mathematics, electives in humanities, social science, and design. Students select a formal focus that concentrates in a subfield of interest in bioengineering: Bioelectrical Concentration or Biomaterials Concentration.

The curriculum provides undergraduates with a solid background in engineering and life sciences in preparation for advanced studies. Through the Bioengineering program, graduates acquire an understanding of biology, biochemistry, and physiology and the capability to apply advanced mathematics, including differential equations and statistics, science, and engineering, to solve the problems at the interface of engineering and biology. Graduates also have an ability to make measurements on and interpret data from living systems, addressing the problems associated with the interaction between living and nonliving materials and systems.

### Combined Bachelor's/Master's Plan

Bioengineering undergraduates may begin a Master of Science degree program while completing the Bachelor of Science degree and use a limited number of courses to satisfy the requirements of both the undergraduate and graduate degrees. Details are available from the Department of Bioengineering.

## BIOELECTRICAL CONCENTRATION

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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#### Second Semester

- 4 - CH 1020 General Chemistry
- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I<sup>2</sup>
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 1 - Biology Requirement<sup>3</sup>

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### Sophomore Year

#### First Semester

- 3 - BIOE 2010 Intro. to Biomedical Engineering
- 2 - ECE 2010 Logic and Computing Devices
- 3 - ECE 2020 Electric Circuits I
- 1 - ECE 2090 Logic and Computing Devices Lab.
- 1 - ECE 2110 Electrical Engineering Lab. I
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II<sup>2</sup>

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#### Second Semester

- 3 - CE 2010 Statics
- 1 - ECE 2120 Electrical Engineering Lab. II
- 3 - ECE 2620 Electric Circuits II
- 2 - ENGR 2080 Engineering Graphics and Machine Design
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 3 - MSE 2100 Introduction to Materials Science

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### Junior Year

#### First Semester

- 4 - BIOL 3150 Functional Human Anatomy
- 3 - CH 2010 Survey of Organic Chemistry<sup>2</sup> and
- 1 - CH 2020 Survey of Organic Chemistry Lab.<sup>2</sup>
- 1 - ECE 3110 Electrical Engineering Lab. III
- 3 - ECE 3200 Electronics I
- 3 - ECE 3300 Signals, Systems, and Transforms

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#### Second Semester

- 3 - BCHM 3050 Essential Elements of Biochem.
- 3 - BIOE 3020 Biomaterials
- 3 - BIOE 3700 Bioinstrumentation and Bioimaging
- 3 - ECE 3800 Electromagnetics
- 3 - BIOE or ECE Technical Requirement<sup>3</sup>

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## Senior Year

### First Semester

- 3 - BIOE 3200 Biomechanics
- 3 - BIOE 4010 Bioengineering Design Theory
- 3 - BIOL 4610 Cell Biology
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - BIOE or ECE Technical Requirement<sup>3</sup>

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### Second Semester

- 1 - BIOE 4000 Senior Seminar
- 3 - BIOE 4030 Applied Biomedical Design
- 3 - BIOE 4480 Tissue Engineering
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 6 - BIOE or ECE Technical Requirement<sup>3</sup>

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128 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Students planning to enter medical school should take CH 2230/2270 instead of CH 2010/2020 and take CH 2240/2280 as an additional course sequence. Students planning to enter medical school should also take physics laboratories as additional courses ((PHYS 1220 course with PHYS 1240 lab and PHYS 2210 course with PHYS 2230 lab).

<sup>3</sup>Select from department-approved list.

#### Notes:

1. To transfer from General Engineering into the Bioengineering degree program, students must have a minimum cumulative grade-point average of 3.0 in courses taken at Clemson and must have earned a C or better in each course in the General Engineering freshman curriculum, including the Arts and Humanities/Social Science Requirements.
2. A student is allowed to enroll in ECE courses (excluding ECE 2070, 2080, 3080) only when all prerequisites have been passed with a grade of C or better.
3. All Bioelectrical Concentration students must have a cumulative engineering grade-point average of 2.0 to enroll in any 3000- or 4000-level ECE courses.
4. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any ECE course.

## BIOMATERIALS CONCENTRATION

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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#### Second Semester

- 4 - CH 1020 General Chemistry
- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I<sup>2</sup>
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 1 - Biology Requirement<sup>3</sup>

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**Sophomore Year****First Semester**

- 3 - BIOE 2010 Intro. to Biomedical Engineering
- 3 - CH 2010 Survey of Organic Chemistry<sup>2</sup>
- 1 - CH 2020 Survey of Organic Chemistry Lab.<sup>2</sup>
- 4 - MATH 2060 Calculus of Several Variables
- 3 - MSE 2100 Introduction to Materials Science
- 3 - PHYS 2210 Physics with Calculus II<sup>2</sup>

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**Second Semester**

- 3 - BIOE 3020 Biomaterials
- 3 - CE 2010 Statics
- 2 - ECE 2070 Basic Electrical Engineering
- 1 - ECE 2080 Electrical Engineering Lab. I
- 2 - ENGR 2080 Engineering Graphics and Machine Design
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

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**Junior Year****First Semester**

- 3 - BIOE 3200 Biomechanics
- 4 - BIOL 3150 Functional Human Anatomy
- 3 - MSE 3190 Materials Processing I
- 3 - MSE 3260 Thermodynamics of Materials
- 3 - MSE 3270 Transport Phenomena

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**Second Semester**

- 3 - BCHM 3050 Essential Elements of Biochem.
- 3 - BIOE 3210 Biofluid Mechanics
- 3 - BIOE 3700 Bioinstrumentation and Biomaging
- 3 - MATH 3020 Statistics for Science and Engr.
- 3 - BIOE Technical Requirement<sup>3</sup>

15

**Senior Year****First Semester**

- 3 - BIOE 4010 Bioengineering Design Theory
- 3 - BIOL 4610 Cell Biology
- 3 - MSE 4150 Intro. to Polymer Science and Engr.
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - BIOE Technical Requirement<sup>3</sup>

15

**Second Semester**

- 1 - BIOE 4000 Senior Seminar
- 3 - BIOE 4030 Applied Biomedical Design
- 3 - BIOE 4480 Tissue Engineering
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 6 - Bioengineering Technical Requirement<sup>3</sup>

16

128 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Students planning to enter medical school should take CH 2230/2270 instead of CH 2010/2020 and take CH 2240/2280 as an additional course sequence. Students planning to enter medical school should also take physics laboratories as additional courses (PHYS 1220 course with PHYS 1240 lab and PHYS 2210 course with PHYS 2230 lab).

<sup>3</sup>Select from department-approved list.

Note: To transfer from General Engineering into the Bioengineering degree program, students must have a minimum cumulative grade-point average of 3.0 in courses taken at Clemson and must have earned a C or better in each course in the General Engineering freshman curriculum including the Arts and Humanities/Social Science Requirements.

**BIOSYSTEMS ENGINEERING****Bachelor of Science**

Biosystems engineering is the field of engineering most closely allied with advances in biology. Biosystems engineers apply engineering design and analysis to biological systems and incorporate fundamental biological principles to engineering designs to achieve ecological balance.

The Biosystems engineering program emphasizes two main areas – sustainable bioprocess engineering, with its basis in microbiology, and ecological engineering, with its basis in ecology. Bioprocess engineering focuses on the sustainable production of biorefinery compounds - biofuels, nutraceuticals, bioactive molecules, and biomaterials - using metabolic pathways found in nature and green processing technologies. Ecological engineering focuses on the design of sustainable communities utilizing low-impact development strategies such as bioretention basins, rainwater harvesting, and bioswales for stormwater retention, treatment, and management. Both emphasis areas interface with ecologically-sound food and energy crop production systems.

Biosystems engineers lead teams to:

- Design bioprocesses and systems for biofuels (biodiesel, hydrogen, ethanol), biopharmaceutical, bioplastics, and food processing industries
- Develop ecological designs (permeable pavement, bioswales, green infrastructure) to integrate water management into the landscape
- Integrate biological sustainability into energy, water and food systems
- Provide engineering expertise for agriculture, food processing, and manufacturing industries.

Biosystems engineering graduates are highly qualified to pursue graduate studies in biosystems engineering, biomedical engineering or ecological engineering fields, or medical or veterinary school.

Students are urged to complete a minor and participate in the Cooperative Education, Biosystems Engineering Intern, and/or Study Abroad Programs. Those interested in medical school can fulfill requirements with the Biosystems Engineering BS degree.

Additional information is available from the departmental offices or at: <http://www.clemson.edu/majors/biosystems-engineering>.

**Combined Bachelor's/Master's Program**

Under this plan, students may reduce the time necessary to earn both degrees by applying graduate credits to both undergraduate and graduate program requirements.

Undergraduate students in Biosystems Engineering may begin a Master of Science or a Master of Engineering Degree in Environmental Engineering and Science or Master of Science Degree in Bioengineering while completing the BS degree.

Students are encouraged to obtain the specific requirements for the dual degree from the academic departments involved as early as possible in their undergraduate program. See *Academic Regulations* in this catalog for enrollment guidelines and procedures.

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 4 - CH 1020 General Chemistry
- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Sophomore Year****First Semester**

- 2 - BE 2120 Fundamentals of Biosystems Engr.
- 3 - CE 2010 Statics<sup>2</sup>
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II
- 4 - Biology Requirement<sup>3</sup>

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**Second Semester**

- 2 - BE 2100 Intro. to Biosystems Engineering
- 2 - CE 2080 Dynamics<sup>2</sup>
- 2 - ENGR 2100 Computer-Aided Design and Engineering Applications
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 3 - ME 3100 Thermodynamics and Heat Transfer
- 4 - MICR 3050 General Microbiology

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**Junior Year****First Semester**

- 3 - BE 3200 Principles and Practices of Geomatics
- 3 - BE 4100 Biol. Kinetics and Reactor Modeling
- 3 - CH 2230 Organic Chemistry
- 1 - CH 2270 Organic Chemistry Laboratory
- 2 - ECE 2070 Basic Electrical Engineering
- 1 - ECE 2080 Electrical Engineering Lab. I
- 3 - Mechanics of Materials Requirement<sup>4</sup>

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**Second Semester**

- 3 - BE 3220 Small Watershed Hydrology and Sedimentology
- 3 - BE 4120 Heat and Mass Transport in BE
- 3 - BE 4380 Bioprocess Engineering Design
- 4 - CE 3410 Introduction to Fluid Mechanics
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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<sup>1</sup>Students should choose courses to fulfill General Education requirements including Humanities, Social Science, Cross-Cultural Awareness and Science and Technology in society components. See *Undergraduate Announcements* and academic advisor for details.

<sup>2</sup>ME 2010 may be substituted for CE 2010 and 2080

<sup>3</sup>BIOL 1030/1050 or 1100

<sup>4</sup>CE 2060 or ME 2040

## BIOPROCESS ENGINEERING EMPHASIS AREA

### Senior Year

#### First Semester

- 3 - BE 4280 Biochemical Engineering
  - 2 - BE 4740 Biosystems Engr. Design/Project Mgt.
  - 2 - BE 4750 Biosystems Engr. Capstone Design
  - 3 - BIOL 4410 Ecology
  - 5 - Biochemistry Requirement<sup>3</sup>
- 
- 15

#### Second Semester

- 6 - Engineering Requirement<sup>2</sup>
  - 3 - Life Science Requirement<sup>4</sup>
  - 6 - Arts and Humanities Requirement<sup>1</sup> or
  - 6 - Social Science Requirement<sup>1</sup>
- 
- 15

128 Total Semester Hours

<sup>1</sup>Students should choose courses to fulfill General Education requirements including Humanities, Social Science, Cross-Cultural Awareness and Science and Technology in society components. See *Undergraduate Announcements* and academic advisor for details.

<sup>2</sup>See Departmental List (Minimum 6000 level for BS/MS program.

<sup>3</sup>Choose BCHM 3050 and BIOL 4340.

<sup>4</sup>Life Science requirement: Choose BIOL, BCHM, GEN, MICR, WFB 3000-level or above or other approved course.

## ECOLOGICAL ENGINEERING EMPHASIS AREA

### Senior Year

#### First Semester

- 2 - BE 4740 Biosystems Engr. Design/Project Mgt.
  - 2 - BE 4750 Biosystems Engr. Capstone Design
  - 3 - BIOL 4410 Ecology
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Ecological Requirement<sup>2</sup>
  - 2 - Engineering Requirement<sup>3</sup>
- 
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#### Second Semester

- 2 - BE 4210 Engineering Systems for Soil Water Management
  - 3 - BE 4240 Ecological Engineering
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
  - 4 - Ecological Requirement<sup>2</sup>
  - 3 - Engineering Requirement<sup>3</sup>
- 
- 15

128 Total Semester Hours

<sup>1</sup>Students should choose courses to fulfill General Education requirements including Humanities, Social Science, Cross-Cultural Awareness and Science and Technology in society components. See *Undergraduate Announcements* and academic advisor for details.

<sup>2</sup>Ecological Requirement: Choose from BIOL, FOR, PES, WFB 3000-level or above or other approved course.

<sup>3</sup>See Departmental List (Minimum 6000 level for BS/MS program.

Notes for Bioprocess and Ecological Engineering emphasis areas:

1. Biosystems Engineering students are allowed to enrol in upper-level BE courses only when the following prerequisites have been completed with C or better: CE 2010, 2060, 2080, 3410.
2. Biosystems Engineering students are encouraged to complete a Minor, Coop Ed program, internship (BE 3700) and/or a Study Abroad Program.

3. Possible minors include Environmental Science and Policy, Sustainability, Wildlife, Forestry and Fisheries.
4. Departmental Honors Thesis (BE 3000/3010/4000) is available for qualifying Junior/Senior students.
5. Biosystems Engineering majors are encouraged to consider possibilities of graduate study early in the undergraduate program and plan accordingly; including the possibility of participating in Clemson's BS/MS program wherein six credits may count in both the BS and a MS degree.

## CHEMICAL ENGINEERING

### Bachelor of Science

The Department of Chemical and Biomolecular Engineering offers the Bachelor of Science degree in Chemical Engineering. Chemical Engineering students select one of several emphasis areas (such as energy studies or environmental engineering), a concentration in Biomolecular Engineering (to prepare them for medical school or a career in biotechnology), or any approved minor.

Chemical engineering is based on chemistry, biology, physics, and mathematics. The curriculum at Clemson includes classroom and laboratory instruction and emphasizes broadly applicable fundamental principles and current technology to prepare graduates for professional practice and professional growth. The Educational Objective of the BS degree program is for graduates to have careers characterized by:

- success in chemical engineering practice, post-graduate education, or other areas making use of engineering skills, as defined by accomplishments and/or job satisfaction;
- demonstrated success in the design of chemical processes and/or identification, formulation, and solution of chemical engineering problems;
- ethical behavior in all endeavors;
- demonstrated effectiveness in teamwork, communication, and service to society through professional contributions;
- demonstrated technical and/or managerial leadership; and
- demonstrated commitment to lifelong learning.

Chemical engineers are involved in the research, manufacture, sales, and use of commodity and specialty chemicals, fuels, pharmaceuticals, electronic components, synthetic fibers and textiles, food and consumer goods, and many other products. They work on environmental pollution prevention and remediation and apply engineering science to solve medical and health-related problems.

### Combined Bachelor of Science/ Master of Science

Qualified students can reduce the time to earn a Master's Degree by applying graduate credits to both the Bachelor's and Master's program requirements. Undergraduate Chemical and Biomolecular Engineering students who have earned a grade-point average of 3.4 or above and completed 90 credit hours can begin work toward a Master of Science in Chemical Engineering or a Master of Science in Environmental Engineering and Science by selecting approved graduate courses for their emphasis area. Details are available in the ChBE Undergraduate Handbook, which can be found at [www.clemson.edu/ces/chbe](http://www.clemson.edu/ces/chbe).

## Freshman Year

### First Semester

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 1 - ENGR 1050 Engineering Disciplines and Skills I
  - 1 - ENGR 1060 Engineering Disciplines and Skills II
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
- 
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### Second Semester

- 4 - CH 1020 General Chemistry
  - 2 - CHE 1300 Chemical Engineering Tools
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 1220 Physics with Calculus I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
- 
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## Sophomore Year

### First Semester

- 3 - CH 2230 Organic Chemistry
  - 4 - CHE 2110 Intro. to Chemical Engineering
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2210 Physics with Calculus II
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
- 
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### Second Semester

- 3 - CH 2240 Organic Chemistry
  - 1 - CH 2290 Organic Chemistry Lab.
  - 3 - CHE 2200 Chemical Engr. Thermodynamics I
  - 4 - CHE 2300 Fluids/Heat Transfer
  - 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 
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## Junior Year

### First Semester

- 1 - CH 3390 Physical Chemistry Lab.
  - 3 - CHE 3070 Unit Operations Lab. I
  - 3 - CHE 3190 Engineering Materials
  - 2 - ECE 2070 Basic Electrical Engineering
  - 1 - ECE 2080 Electrical Engineering Lab. I
  - 3 - STAT 4110 Statistical Methods for Process Development and Control
  - 3 - Biochemistry Option<sup>2</sup> or
  - 3 - Emphasis Area<sup>3</sup>
- 
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### Second Semester

- 3 - CH 3320 Physical Chemistry
  - 1 - CH 3400 Physical Chemistry Lab.
  - 3 - CHE 3210 Chemical Engr. Thermodynamics II
  - 4 - CHE 3300 Mass Transfer and Separation Proc.
  - 3 - Arts and Humanities Requirement<sup>1</sup> or
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Biochemistry Option<sup>2</sup> or
  - 3 - Emphasis Area<sup>3</sup>
- 
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**Senior Year****First Semester**

- 3 - CHE 4070 Unit Operations Lab. II
- 3 - CHE 4310 Chemical Process Design I
- 1 - CHE 4430 Chemical Engr. Senior Seminar I
- 3 - CHE 4500 Chemical Reaction Engineering
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - Emphasis Area Requirement<sup>3</sup>

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**Second Semester**

- 3 - CHE 3530 Process Dynamics and Control
- 3 - CHE 4330 Process Design II
- 1 - CHE 4440 Chemical Engr. Senior Seminar II
- 3 - MICR 4130 Industrial Microbiology
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - Emphasis Area Requirement<sup>3</sup>

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129 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Select one course from BCHM 3050, BMOL 4250, or CH 3600.

<sup>3</sup>See advisor for details. Nine credit hours devoted to completion of an emphasis area or approved minor are required. Emphasis areas are Applied Engineering, Mathematics and Science; Biomolecular Science and Engineering; Business Management; Environmental Engineering; Polymeric Materials; Energy Studies.

Note: No student may exceed a maximum of two attempts, including a W, to complete successfully any CHE course.

**BIOMOLECULAR ENGINEERING CONCENTRATION****Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 4 - CH 1020 General Chemistry
- 2 - CHE 1300 Chemical Engineering Tools
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Sophomore Year****First Semester**

- 5 - BIOL 1100 Principles of Biology I
- 3 - CH 2230 Organic Chemistry
- 4 - CHE 2110 Intro. to Chemical Engineering
- 4 - MATH 2060 Calculus of Several Variables
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 2 - BIOL 4340 Biological Chem. Lab. Techniques
- 3 - CH 2240 Organic Chemistry
- 1 - CH 2290 Organic Chemistry Lab.
- 3 - CHE 2200 Chemical Engr. Thermodynamics I
- 4 - CHE 2300 Fluids/Heat Transfer
- 3 - Biochemistry Option<sup>2</sup>

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**Junior Year****First Semester**

- 3 - BIOE 3020 Biomaterials
- 3 - BCHM 4310 Physical Approach to Biochem.
- 3 - CHE 3070 Unit Operations Lab. I
- 3 - CHE 3190 Engineering Materials
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

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**Second Semester**

- 3 - BMOL 4250 Biomolecular Engineering
- 3 - CHE 3210 Chemical Engr. Thermodynamics II
- 4 - CHE 3300 Mass Transfer and Separation Proc.
- 3 - PHYS 2210 Physics with Calculus II
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Senior Year****First Semester**

- 3 - CHE 4070 Unit Operations Lab. II
- 3 - CHE 4310 Chemical Process Design I
- 1 - CHE 4430 Chemical Engr. Senior Seminar I
- 3 - CHE 4500 Chemical Reaction Engineering
- 3 - STAT 4110 Statistical Methods for Process Development and Control
- 3 - Engineering Requirement<sup>1</sup>

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**Second Semester**

- 3 - CHE 3530 Process Dynamics and Control
- 3 - CHE 4330 Process Design II
- 1 - CHE 4440 Chemical Engr. Senior Seminar II
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - Engineering Requirement<sup>3</sup>

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131 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Select from BCHM 3050 or CH 3600.

<sup>3</sup>Select from CHE 4010 or BMOL 4030, 4230, 4260, 4270, BE 4280, MICR 4130.

Note: No student may exceed two attempts, including a W, to complete successfully any CHE course.

**CIVIL ENGINEERING****Bachelor of Science**

Civil Engineering involves the planning, design, construction management, operation, and maintenance of facilities and systems in the built environment, including bridges, buildings, airports, water supply systems, ports, dams, and highways.

The Bachelor of Science degree program in Civil Engineering includes the common educational goals listed on page 93 for the College of Engineering and Science. The complete objectives of the program can be found at [www.clemson.edu/ce](http://www.clemson.edu/ce).

The first two years provide students with building blocks necessary to be successful civil engineers, including proficiency in calculus, engineering mechanics, physics, and chemistry. During the junior year, students receive a broad introduction to the fundamental areas of civil engineering (structures, hydraulics, geotechnical, transportation, environmental, construction materials, and construction engineering and management). Design experiences are integrated throughout the curriculum, culminating in the senior year with a major capstone design project. In addition, during the senior year, students can select from available emphasis areas that serve to strengthen their undergraduate background.

The Civil Engineering program prepares students to work immediately upon graduation in most areas of civil engineering or to pursue graduate degrees. Students are also exposed to issues related to professional practice, including professional registration, life-long learning, and communication and team skills. Because a concerned society demands a realistic consideration of the impacts of engineering projects, civil engineering students are also educated in the broad areas of the humanities and social sciences.

To be eligible for admission into the Bachelor of Science degree program in Civil Engineering, students must have completed the courses outlined in the freshman core curriculum and have a cumulative grade-point average of 2.6 or higher.

The Department of Civil Engineering allows eligible students to count up to six hours of graduate credit (6000- and 8000-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have completed the junior year, must have earned a minimum 3.4 grade-point average, and must be approved by the department. Details of the suggested curriculum and program information are available from the department.

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 2 - ENGR 2100 Computer-Aided Design and Engineering Applications
- 3 - GEOL 1010 Physical Geology
- 1 - GEOL 1030 Physical Geology Lab.
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 1 - PHYS 1240 Physics Lab. I

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**Sophomore Year****First Semester**

- 3 - CE 2010 Statics
- 3 - CE 2550 Geomatics
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II
- 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities Requirement<sup>1</sup> *or*
- 3 - Social Science Requirement<sup>1</sup>

17**Second Semester**

- 4 - CE 2060 Structural Mechanics
- 2 - CE 2080 Dynamics
- 2 - CE 3520 Economic Evaluation of Projects
- 3 - COMM 2500 Public Speaking
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

15**Junior Year****First Semester**

- 3 - CE 3010 Structural Analysis
- 3 - CE 3310 Construction Engineering and Mgt.
- 4 - CE 3410 Introduction to Fluid Mechanics
- 4 - CE 3510 Civil Engineering Materials
- 3 - MATH 3020 Statistics for Engineering and Science

17**Second Semester**

- 3 - CE 3110 Transportation Engineering Planning and Design
- 4 - CE 3210 Geotechnical Engineering
- 3 - CE 3420 Applied Hydraulics and Hydrology
- 1 - CE 3530 Professional Seminar
- 3 - EES 4010 Environmental Engineering
- 3 - Design Technical Requirement<sup>2</sup>

17**Senior Year****First Semester**

- 3 - ENGL 3140 Technical Writing
- 3 - Design Technical Requirement<sup>2</sup>
- 6 - Technical Requirement<sup>3</sup>
- 3 - Technical Requirement Restricted<sup>3</sup>

15**Second Semester**

- 3 - CE 4590 Capstone Design Project
- 3 - Arts and Humanities Requirement<sup>1</sup> *or*
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Technical Requirement<sup>3</sup>
- 3 - Elective

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129 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>See advisor for approved list.

<sup>3</sup>See advisor for approved list. Technical Requirements and electives may be used to complete an emphasis area in one or more of the following fields: Applied Fluid Mechanics, Construction, Environmental Engineering, Geotechnical/Geoenvironmental Engineering, Structural Engineering, or Transportation Engineering.

**Notes:**

1. Civil Engineering students may neither enroll in nor receive credit for any CE or EM course unless they have a 2.0 Engineering grade-point average.
2. Civil Engineering students enrolling in any CE course (except CE 4590) must have a grade of C or better in the prerequisites for that course.

**COMPUTER ENGINEERING****Bachelor of Science**

Computer engineers have excellent career opportunities in the design and application of hardware and software components for a variety of computer applications. These include mainframe, desktop, and embedded microprocessor platforms, as well as the networking of various types of computers and peripherals.

Based on a strong foundation in mathematics, computer science, and the physical sciences, the Computer Engineering program includes engineering science and design in circuits, electronics, computer organizations and design, peripheral interfacing, and software engineering. Emphasis is placed on hands-on experience with networked computer systems, micro-, mini-, and mainframe computers, and the solution of a wide range of practical problems using engineering principles. In addition to these technical skills, students learn to communicate effectively and to develop interpersonal, teamwork, and management skills, all of which contribute to success in a professional engineering career. The program is also an excellent preparation for graduate study.

Information on the program and its objectives is available at [www.clemson.edu/ces/departments/ece/](http://www.clemson.edu/ces/departments/ece/).

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> *or*
- 3 - Social Science Requirement<sup>1</sup>

16**Second Semester**

- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 6 - Arts and Humanities Requirement<sup>1</sup> *or*
- 6 - Social Science Requirement<sup>1</sup>

16**Sophomore Year****First Semester**

- 3 - CPSC 1110 Elementary Computer Programming in C/C++
- 2 - ECE 2010 Logic and Computing Devices
- 3 - ECE 2020 Electric Circuits I
- 1 - ECE 2090 Logic and Computing Devices Lab.
- 1 - ECE 2110 Electrical Engineering Lab. I
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II

17**Second Semester**

- 1 - ECE 2120 Electrical Engineering Lab. II
- 3 - ECE 2220 Systems Programming Concepts for Computer Engineering
- 3 - ECE 2620 Electric Circuits II
- 3 - ECE 2720 Computer Organization
- 1 - ECE 2730 Computer Organization Laboratory
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

15**Junior Year****First Semester**

- 3 - ECE 2230 Computer Systems Engineering
- 1 - ECE 3110 Electrical Engineering Lab. III
- 3 - ECE 3200 Electronics I
- 3 - ECE 3300 Signals, Systems, and Transforms
- 3 - ECE 3710 Microcontroller Interfacing
- 1 - ECE 3720 Microcontroller Interfacing Lab.
- 3 - MATH 3110 Linear Algebra

17**Second Semester**

- 3 - ECE 3170 Random Signal Analysis
- 3 - ECE (CPSC) 3220 Intro. to Operating Systems
- 3 - ECE 3270 Digital Computer Design
- 3 - ECE 3520 Programming Systems
- 3 - MATH 4190 Discrete Math. Structures I

15**Senior Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*
- 3 - COMM 2500 Public Speaking
- 3 - ECE 4090 Continuous and Discrete Sys. Design
- 2 - ECE 4950 Integrated System Design I
- 3 - ENGL 3140 Technical Writing
- 6 - Computer Engineering Technical Requirement<sup>2</sup>

17**Second Semester**

- 2 - ECE 4960 Integrated System Design II
- 3 - Arts and Humanities Requirement<sup>1</sup> *or*
- 3 - Social Science Requirement<sup>1</sup>
- 6 - Computer Engineering Technical Requirement<sup>2</sup>
- 3 - Special Requirement<sup>3</sup>

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127 Total Semester Hours

<sup>1</sup>See General Education section of the *Undergraduate Announcements*. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Select from department-approved list.

<sup>3</sup>Three additional credits of university or college approved Arts and Humanities or Social Science courses; or ELE 3010 or 4010; or any additional three-credit, 4000-level course from the departmental Computer Engineering Technical Requirement list or Electrical Engineering Technical Requirement list; or one additional course selected from MATH 4120, 4340, 4350, 4400, 4410, or 4530.

**Notes:**

1. A student is allowed to enroll in ECE courses (excluding ECE 2070, 2080, 3080) only when all prerequisites have been passed with a grade of C or better.
2. All Computer Engineering students must have a cumulative engineering grade-point average of 2.0 to enroll in any 3000- or 4000-level ECE courses.
3. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any ECE course.

## ELECTRICAL ENGINEERING

### Bachelor of Science

Electrical engineers are in high demand for a wide range of influential positions. Professional duties range from analytical problem solving to the design of components and systems. The scope of employment requires a unique breadth and depth of knowledge and technical skills, which are reflected in the Electrical Engineering program. This program also offers an excellent preparation for graduate education. Detailed information can be found at [www.clemson.edu/ces/departments/ece/](http://www.clemson.edu/ces/departments/ece/).

Building on a foundation of mathematical and physical sciences, students progress into the application of these in the engineering science areas of circuits, electronics, communications, controls, power, and electromagnetics. In these subjects, students also begin to apply the concepts and techniques learned to the design of circuits and systems. Senior technical design courses offer the opportunity to further develop expertise in a selected area.

In addition to these technical skills, students learn to communicate effectively, both orally and with the written word. Because engineers work for the benefit of society, the curriculum includes a strong component of humanities and social science courses. Also, many project design assignments enable the development of interpersonal, teamwork, and management skills, which are necessary for success in a professional engineering career.

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

#### Second Semester

- 4 - CH 1020 General Chemistry
- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

### Sophomore Year

#### First Semester

- 3 - CPSC 1110 Elementary Computer Programming in C/C++
- 2 - ECE 2010 Logic and Computing Devices
- 3 - ECE 2020 Electric Circuits I
- 1 - ECE 2090 Logic and Computing Devices Lab.
- 1 - ECE 2110 Electrical Engineering Lab. I
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II

#### Second Semester

- 1 - ECE 2120 Electrical Engineering Lab. II
- 3 - ECE 2620 Electric Circuits II
- 3 - ECE 2720 Computer Organization
- 1 - ECE 2730 Computer Organization Laboratory
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

### Junior Year

#### First Semester

- 1 - ECE 3110 Electrical Engineering Lab. III
- 3 - ECE 3200 Electronics I
- 3 - ECE 3300 Signals, Systems, and Transforms
- 3 - ECE 3600 Electric Power Engineering
- 3 - ECE 3800 Electromagnetics
- 3 - Advanced Mathematics Requirement<sup>2</sup>

#### Second Semester

- 1 - ECE 3120 Electrical Engineering Lab. IV
- 3 - ECE 3170 Random Signal Analysis
- 3 - ECE 3210 Electronics II
- 3 - ECE 3710 Microcontroller Interfacing
- 1 - ECE 3720 Microcontroller Interfacing Lab.
- 3 - ECE 3810 Fields, Waves, and Circuits
- 3 - ENGL 3140 Technical Writing

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### Senior Year

#### First Semester

- 3 - COMM 1500 Intro. to Human Comm. or  
3 - COMM 2500 Public Speaking
- 3 - ECE 4090 Continuous and Discrete Syst. Des.
- 3 - ECE 4270 Communications Systems
- 2 - ECE 4950 Integrated Systems Design I
- 3 - Electrical Engineering Technical Requirement<sup>3</sup>

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#### Second Semester

- 2 - ECE 4960 Integrated System Design II
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 6 - Electrical Engineering Technical Requirement<sup>3</sup>
- 3 - Special Requirement<sup>4</sup>

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126 Total Semester Hours

<sup>1</sup>See General Education section of the *Undergraduate Announcements*. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>MATH 4190, 4340, 4350, 4530, or 4540

<sup>3</sup>Select from department-approved list.

<sup>4</sup>Three additional credits of university or college approved Arts and Humanities or Social Science courses; or ELE 3010 or 4010; or any additional three-credit, 4000-level course from the departmental Computer Engineering Technical Requirement list or Electrical Engineering Technical Requirement list; or one additional course selected from MATH 3110, 4120, 4190, 4340, 4350, 4400, 4410, 4530, or 4540.

#### Notes:

1. A student is allowed to enroll in ECE courses (excluding ECE 2070, 2080, 3080) only when all prerequisites have been passed with a grade of C or better.
2. All Electrical Engineering students must have a cumulative engineering grade-point average of 2.0 to enroll in any 3000- or 4000-level ECE courses.
3. No student may exceed a maximum of two attempts, excluding a W, to complete successfully any ECE course.

## ENVIRONMENTAL ENGINEERING

### Bachelor of Science

Our complex world faces many challenges, including contaminated water supplies, hazardous wastes, an increasing population and limited resources. Environmental engineers help to solve many of the environmental problems faced by society using the principles of biology, chemistry, physics, mathematics and earth sciences. An undergraduate degree in Environmental Engineering opens the door to a variety of rewarding career options. Environmental engineers protect water quality by designing water and wastewater treatment systems; ensure public safety by managing solid, hazardous and radioactive wastes; improve air quality by controlling emissions from mobile and stationary sources; reduce human health risks by tracking contaminants as they move through the environment; clean up toxic waste spills and restore historically contaminated sites; and design a more sustainable future by understanding our use of resources.

The curriculum for the Bachelor of Science degree in Environmental Engineering consists of 127 credit hours. All students participate in one professional seminar course and complete a capstone design project.

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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#### Second Semester

- 4 - CH 1020 General Chemistry
- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 3 - HIST 1240 Environmental History Survey<sup>2</sup>
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I

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### Sophomore Year

#### First Semester

- 3 - BIOL 1030 General Biology<sup>3</sup>
- 1 - BIOL 1050 General Biology Lab<sup>3</sup>
- 3 - CE 2010 Statics
- 3 - EES 2010 Environmental Engineering Fund. I
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II

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#### Second Semester

- 2 - CE 2080 Dynamics
- 3 - CH 2010 Survey of Organic Chemistry<sup>4</sup>
- 4 - EES 2020 Environmental Engineering Fund. II
- 2 - ENGR 2100 Computer-Aided Design and Engineering Applications<sup>5</sup>
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

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**Junior Year****First Semester**

- 2 - EES 3030 Water Treatment
- 2 - EES 3040 Wastewater Treatment
- 1 - EES 3050 Water and Wastewater Treatment Lab
- 3 - MATH 3020 Statistics for Science and Engineering
- 4 - MICR 3050 General Microbiology
- 3 - Arts and Humanities Requirement<sup>1</sup> *or*  
3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 4 - CE 3410 Introduction to Fluid Mechanics
- 3 - EES 4840 Municipal Solid Waste Mgt.
- 3 - EES 4850 Hazardous Waste Management
- 3 - GEOL 1010 Physical Geology<sup>6</sup>
- 1 - GEOL 1030 Physical Geology Lab<sup>6</sup>
- 3 - ME 3100 Thermodynamics and Heat Transfer

**Senior Year****First Semester**

- 3 - EES 4300 Air Pollution Engineering
- 1 - EES 4500 Environ. Engr. Senior Seminar
- 3 - EES 4800 Environmental Risk Assessment
- 3 - EES 4860 Environmental Sustainability
- 2 - Engineering Economics Requirement<sup>7</sup>
- 3 - Engineering or Science Requirement<sup>8</sup>

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**Second Semester**

- 3 - EES 4750 Capstone Design Project
- 6 - Engineering or Science Requirement<sup>8</sup>
- 6 - Arts and Humanities Requirement<sup>1</sup> *or*  
6 - Social Science Requirement<sup>1</sup>

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127 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Three of these credit hours must also satisfy the Cross-Cultural Awareness General Education requirement. Students are encouraged (but not required) to take PHIL 3450 (Environmental Ethics) to fulfill the non-literature humanities requirement.

<sup>2</sup>HIST 1240 satisfies three credit hours of the social science requirement and the Science and Technology in Society General Education requirement. If a student is unable to enroll in the second semester of the freshman year, this course may be taken at another time.

<sup>3</sup>May substitute BIOL 1100 for BIOL 1030 and BIOL 1050; BIOL 1100 is five hours.

<sup>4</sup>May substitute CH 2230.

<sup>5</sup>May substitute ENGR 2080.

<sup>6</sup>May substitute PES 2020 for GEOL 1010 and GEOL 1030.

<sup>7</sup>Select CE 3520 or IE 3840.

<sup>8</sup>Select any combination of engineering and/or science courses from a department-approved list.

**Notes:**

1. The following courses must be completed with a C or better: CE 2010, CE 2080, CE 3410, MATH 2060, MATH 2080, PHYS 2210.

**INDUSTRIAL ENGINEERING****Bachelor of Science**

Industrial engineers design, install, and improve the complex systems that provide goods and services vital to our society and economy. These systems place unique demands for breadth of preparation on industrial engineers. The Industrial Engineering baccalaureate program prepares graduates to: (1) design, develop, implement, and improve integrated systems that include people, materials, information, equipment, and energy using appropriate analytical, computational and experimental practices; (2) apply information technologies to the practice of industrial engineering; (3) conduct themselves in a professional and ethical manner; and (4) work and communicate effectively with colleagues at every level in the organization.

The traditional arenas for the practice of industrial engineering are the manufacturing facilities of industry; however, many practicing industrial engineers are employed in non-manufacturing institutions such as hospitals, banks, and government agencies. In addition to numerous employment opportunities in professional practice, industrial engineering graduates may further their formal education. The Department of Industrial Engineering offers programs leading to the Master of Science and Doctor of Philosophy degrees.

The Department of Industrial Engineering allows students to count up to 12 hours of graduate credit (approved 6000- and 8000-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point average of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Industrial Engineering Department.

Detailed curriculum and department information is available at [www.ces.clemson.edu/ie](http://www.ces.clemson.edu/ie).

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry<sup>1</sup>
- 3 - ENGL 1030 Accelerated Composition<sup>1</sup>
- 1 - ENGR 1050 Engineering Disciplines and Skills I<sup>1</sup>
- 1 - ENGR 1060 Engineering Disciplines and Skills II<sup>1</sup>
- 4 - MATH 1060 Calculus of One Variable I<sup>1</sup>
- 3 - Arts and Humanities Requirement<sup>2</sup> *or*  
3 - Social Science Requirement<sup>2</sup>

**Second Semester**

- 1 - ENGR 1070 Programming and Problem Solving I<sup>1</sup>
- 1 - ENGR 1080 Programming and Problem Solving II<sup>1</sup>
- 1 - ENGR 1090 Programming and Problem Solving Applications<sup>1</sup>
- 4 - MATH 1080 Calculus of One Variable II<sup>1</sup>
- 3 - PHYS 1220 Physics with Calculus I<sup>1</sup>
- 3 - Arts and Humanities Requirement<sup>2</sup> *or*  
3 - Social Science Requirement<sup>2</sup>
- 4 - Lab Science Requirement<sup>3</sup>

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**Sophomore Year****First Semester**

- 1 - IE 2000 Sophomore Seminar in IE
- 4 - IE 2010 System Design I
- 3 - IE 2800 Methods of Operational Research I
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II
- 1 - PHYS 2230 Physics Lab. II<sup>4</sup>

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**Second Semester**

- 3 - CE 2010 Statics<sup>5</sup>
- 2 - ENGR 2080 Engineering Graphics and Machine Design *or*  
2 - ENGR 2090 Introduction to Engineering/Computer Graphics
- 3 - IE 2100 Design and Analysis of Work Systems
- 3 - IE 3840 Engineering Economic Analysis
- 3 - MSE 2100 Introduction to Materials Science
- 3 - Arts and Humanities Requirement<sup>2</sup> *or*  
3 - Social Science Requirement<sup>2</sup>

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**Junior Year****First Semester**

- 3 - IE 3600 Design and Control of Industrial Sys. I
- 1 - IE 3680 Professional Practice in IE
- 3 - IE 4400 Decision Support Systems in IE
- 6 - Arts and Humanities Requirement<sup>2</sup> *or*  
6 - Social Science Requirement<sup>2</sup>
- 3 - Ethics and Professional Practice Requirement<sup>3</sup>

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**Second Semester**

- 3 - COMM 1500 Intro. to Human Comm.<sup>6</sup> *or*  
3 - COMM 2500 Public Speaking<sup>6</sup>
- 2 - ECE 2020 Electric Circuits I *and*  
1 - ECE 2110 Electrical Engineering Lab. I *or*  
2 - ECE 2070 Basic Electrical Engineering *and*  
1 - ECE 2080 Electrical Engineering Lab. I
- 3 - IE 3610 Design and Control of Industrial Sys. II
- 3 - IE 3810 Methods of Operational Research II
- 3 - IE 3860 Production Planning and Control

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**Senior Year****First Semester**

- 3 - IE 4610 Quality Engineering
- 3 - IE 4650 Facilities Planning and Design
- 4 - IE 4820 Systems Modeling
- 6 - Technical Requirement<sup>3</sup>

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**Second Semester**

- 3 - IE 4670 Systems Design II
- 3 - Management Requirement<sup>3</sup>
- 3 - Mathematics or Natural Science Requirement<sup>3</sup>
- 3 - Technical Requirement<sup>3</sup>

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125 Total Semester Hours

<sup>1</sup>This course must be passed with a C or better either to transfer into IE from General Engineering or to satisfy later course prerequisites.

<sup>2</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>3</sup>Select from department-approved list. See advisor.

<sup>4</sup>PHYS 1240 may be substituted.

<sup>5</sup>ME 2010 may be substituted.

<sup>6</sup>See General Education Requirements. COMM 1500 is recommended.

## MATERIALS SCIENCE AND ENGINEERING

### Bachelor of Science

Materials scientists and engineers design, develop, and produce traditional and new advanced materials with diverse applications intended for use in a wide variety of industries. These include traditional materials-intensive industries such as structural clay, foundry, whiteware, polymers, plastics, fibers, textiles, composite materials, and automotive industries. Also included are high performance technology industries such as semiconductor, defense, biomaterials, aerospace, and communication industries. The broad career responsibilities of this discipline require competence in science, engineering, mathematics, and the social sciences. The curriculum develops skills in problem solving, engineering analysis, and design, as well as oral and written communication.

The School of Materials Science and Engineering offers two areas of concentration within the Bachelor of Science degree in Materials Science and Engineering. The Inorganic Materials Concentration provides for more in-depth study of the engineering and science of materials such as ceramics, glasses, metals, optical and electronic materials; while the Polymeric Materials Concentration provides more emphasis on plastics, elastomers, fibers and fibrous materials, films, coatings and adhesives. Students select either the Inorganic Materials Concentration or the Polymeric Materials Concentration at the beginning of their sophomore year. Both concentrations in Materials Science and Engineering integrate laboratory with classroom experiences to prepare students for life-long learning and exciting career opportunities. Courses covering thermodynamics, kinetics, mechanical behavior, processing, fabrication and characterization of materials prepare students for careers in industry and for graduate school.

In addition to the common educational objectives of all engineering programs, baccalaureate degree graduates in Materials Science and Engineering will be able to:

- demonstrate learning consistent with Accreditation Board for Engineering and Technology Engineering Criteria 2011 for materials engineering programs;
- function easily and well in the laboratory and plant environments; and
- serve the local, national, and international materials communities.

Specifically, the Accreditation Board for Engineering and Technology Engineering Criteria 2011 requires that baccalaureate degree graduates in Materials Science and Engineering be able to:

- apply advanced scientific and engineering principles to materials systems;
- demonstrate an integrated understanding of the scientific and engineering principles underlying structure, properties, processing, and performance relationships;
- apply this understanding to the solution of materials engineering selection and design problems; and
- apply appropriate experimental, statistical, and computational methods to advantage in the solution of materials problems.

## INORGANIC MATERIALS CONCENTRATION

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 1 - ENGR 1050 Engineering Disciplines and Skills I
  - 1 - ENGR 1060 Engineering Disciplines and Skills II
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 16

#### Second Semester

- 4 - CH 1020 General Chemistry
  - 1 - ENGR 1070 Programming and Problem Solving I
  - 1 - ENGR 1080 Programming and Problem Solving II
  - 1 - ENGR 1090 Programming and Problem Solving Applications
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 1220 Physics with Calculus I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 17

### Sophomore Year

#### First Semester

- 3 - CH 2010 Survey of Organic Chemistry
  - 1 - CH 2020 Survey of Organic Chemistry Lab.
  - 3 - MSE 2100 Introduction to Materials Science
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2210 Physics with Calculus II
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 17

#### Second Semester

- 3 - CE 2010 Statics
  - 2 - ENGR 2080 Engineering Graphics and Machine Design
  - 1 - MSE 2410 Metrics Laboratory
  - 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 6 - Arts and Humanities Requirement<sup>1</sup> or  
6 - Social Science Requirement<sup>1</sup>
- 16

### Junior Year

#### First Semester

- 3 - COMM 2500 Public Speaking
  - 3 - MSE 3190 Materials Processing I
  - 3 - MSE 3260 Thermodynamics of Materials
  - 3 - MSE 3270 Transport Phenomena
  - 3 - MSE 4150 Intro. to Polymer Sci. and Engr.
- 15

#### Second Semester

- 3 - IE 3840 Engineering Economic Analysis
  - 3 - MATH 3020 Statistics for Science and Engr. or  
3 - STAT 2300 Statistical Methods I
  - 3 - MSE 3280 Phase Diagrams for Materials Processing and Applications
  - 2 - MSE 3420 Structure/Property Laboratory
  - 3 - MSE 3610 Proc. Metals and Their Composites
  - 3 - MSE 4220 Mechanical Behavior of Materials
- 17

### Senior Year

#### First Semester

- 3 - MSE 4020 Solid State Materials
  - 3 - MSE 4130 Noncrystalline Materials
  - 3 - MSE 4320 Manufacturing Processes and Sys.
  - 1 - MSE 4410 Manufacturing Laboratory
  - 3 - MSE 4910 Undergraduate Research
- 13

#### Second Semester

- 3 - MSE 4070 Senior Capstone Design
  - 3 - MSE 4160 Electrical Properties of Materials
  - 3 - MSE 4240 Optical Materials and Applications
  - 3 - MSE 4330 Combustion System and Environmental Emissions
  - 1 - MSE 4450 Practice of Materials Engineering
- 13

124 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credits must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society General Education requirements.

## POLYMERIC MATERIALS CONCENTRATION

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 1 - ENGR 1050 Engineering Disciplines and Skills I
  - 1 - ENGR 1060 Engineering Disciplines and Skills II
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 16

#### Second Semester

- 4 - CH 1020 General Chemistry
  - 1 - ENGR 1070 Programming and Problem Solving I
  - 1 - ENGR 1080 Programming and Problem Solving II
  - 1 - ENGR 1090 Programming and Problem Solving Applications
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 122 Physics with Calculus I
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 17

### Sophomore Year

#### First Semester

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Laboratory
  - 3 - MSE 2100 Introduction to Materials Science
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2210 Physics with Calculus II
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 17

#### Second Semester

- 3 - CE 2010 Statics
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Laboratory
  - 2 - ENGR 2080 Engineering Graphics and Machine Design
  - 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - MSE 2500 Polymer & Fiber Science I
- 16

**Junior Year****First Semester**

- 3 - CH 3310 Physical Chemistry
- 3 - COMM 2500 Public Speaking
- 3 - MSE 3270 Transport Phenomena
- 3 - MSE 4150 Intro. to Polymer Sci. and Engineering
- 1 - MSE 4550 Polymer and Fiber Lab.
- 3 - Arts and Humanities Requirement<sup>1</sup> or
- 3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 3 - CH 3320 Physical Chemistry
- 3 - IE 3840 Engineering Economic Analysis
- 3 - MATH 3020 Stat. for Science and Engr. or
- 3 - STAT 2300 Statistical Methods I
- 3 - MSE 4220 Mechanical Behavior or Materials
- 3 - MSE 4560 Polymer and Fiber Science II

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**Senior Year****First Semester**

- 3 - MSE 4580 Surface Phenomena in Materials Science and Engineering
- 1 - MSE 4600 Surface Phenomena in Materials Science and Engineering Laboratory
- 3 - MSE 4610 Polymer and Fiber Science III
- 3 - MSE 4910 Undergraduate Research
- 3 - Technical Requirement<sup>2</sup>

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**Second Semester**

- 3 - MSE 4070 Senior Capstone Design
- 1 - MSE 4450 Practice of Materials Engineering
- 3 - MSE 4570 Color Science
- 1 - MSE 4590 Color Science Laboratory
- 3 - Arts and Humanities Requirement<sup>1</sup> or
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Technical Requirement<sup>2</sup>

14

124 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credits must also satisfy the Cross-Cultural Awareness and the Science and Technology in Society General Education requirements.

<sup>2</sup>See advisor.

**MECHANICAL ENGINEERING****Bachelor of Science**

Breadth, individuality, and flexibility are inherent characteristics of the mechanical engineering profession. Mechanical engineers, in a broad sense, make major contributions to the creation of products and systems that benefit mankind. They work in a variety of areas, including bioengineering, energy systems, environmental and life-support systems, propulsion and transportation systems, food production, materials processing, automated manufacturing, and construction. A wide spectrum of career opportunities is open to them. The practice of mechanical engineering includes one or more of the following activities: manufacturing, testing, research, development, design, technical management, technical sales and marketing, construction, and teaching.

Preparation for a 40–45-year professional career requires development of the whole person through a balanced program encompassing the humanities, social sciences, communication and computer skills, physical and engineering sciences, design, and laboratory experience. Students start with the physical sciences and communication skills and progress through the engineering sciences, ultimately applying the principles learned in such areas as energy conversion and transfer, mechanical design, and systems analysis. Throughout the curriculum, the fundamental nature of engineering as a problem-solving discipline is emphasized.

Most graduates take positions in industry, government, or business. Many, however, continue their formal education in a graduate program. The Department of Mechanical Engineering offers study leading to the Master of Science and Doctor of Philosophy degrees.

Mechanical Engineering students who have a cumulative grade-point average or cumulative engineering grade-point average (EGPA) below 2.0 are on probation and will have restricted enrollment in classes. Students whose cumulative grade-point average is below 2.0 are subject to the regulations stipulated under *Academic Eligibility Policy*. Students on probation for EGPR below 2.0 who fail to recover in the first regular semester (fall or spring) will not be allowed to register for mechanical engineering classes. After one year, such students may petition the Mechanical Engineering Department for continued enrollment. An advising policy for students on probation is available from the Mechanical Engineering Department.

Additional information can be found at [www.clemson.edu/me](http://www.clemson.edu/me).

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
- 1 - ENGR 1050 Engineering Disciplines and Skills I
- 1 - ENGR 1060 Engineering Disciplines and Skills II
- 3 - ENGL 1030 Accelerated Composition
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup> or
- 3 - Social Science Requirement<sup>1</sup>

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**Second Semester**

- 1 - ENGR 1070 Programming and Problem Solving I
- 1 - ENGR 1080 Programming and Problem Solving II
- 1 - ENGR 1090 Programming and Problem Solving Applications
- 2 - ENGR 2080 Engineering Graphics and Machine Design
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 1 - PHYS 1240 Physics Lab. I
- 3 - Arts and Humanities (Lit.) Requirement<sup>1</sup> or
- 3 - Social Science Requirement<sup>1</sup>

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**Sophomore Year****First Semester**

- 1 - ME 2000 Sophomore Seminar
- 5 - ME 2010 Statics and Dynamics for Mech. Engr.
- 2 - ME 2220 Mechanical Engineering Lab. I<sup>2</sup> or
- 3 - MSE 2100 Intro. to Materials Science<sup>2</sup>
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II

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**Second Semester**

- 2 - ECE 2070 Basic Electrical Engineering
- 1 - ECE 2080 Electrical Engineering Lab. I
- 3 - ME 2030 Found. of Thermal and Fluid Systems
- 3 - ME 2040 Mechanics of Materials
- 2 - ME 2220 Mechanical Engineering Lab. I<sup>2</sup> or
- 3 - MSE 2100 Intro. to Materials Science<sup>2</sup>
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations

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**Junior Year****First Semester**

- 3 - ENGL 3140 Technical Writing
- 3 - ME 3030 Thermodynamics
- 3 - ME 3070 Foundations of Mechanical Systems
- 3 - ME 3080 Fluid Mechanics
- 2 - ME 3330 Mechanical Engineering Lab. II<sup>2</sup> or
- 3 - Statistics Requirement<sup>3,2</sup>
- 3 - MATH 3650 Numerical Methods for Engineers

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**Second Semester**

- 3 - ME 3040 Heat Transfer
- 3 - ME 3050 Model. and Analysis of Dynamic Syst.
- 3 - ME 3060 Fundamentals of Machine Design
- 3 - ME 3120 Manufacturing Processes and Their Application
- 2 - ME 3330 Mechanical Engineering Lab. II or
- 3 - Statistics Requirement<sup>3,2</sup>

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**Senior Year****First Semester**

- 3 - ME 4010 Mechanical Engineering Design
- 3 - ME 4030 Control and Integration of Multi-Domain Dynamic Systems
- 2 - ME 4440 Mechanical Engineering Lab. III or
- 3 - Technical Requirement<sup>4</sup> or
- 3 - Arts and Humanities Requirement<sup>1</sup> or
- 3 - Social Science Requirement<sup>1</sup>
- 3 - Mechanical Engineering Technical Requirement<sup>4</sup>

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**Second Semester**

- 1 - ME 4000 Senior Seminar
- 3 - ME 4020 Internship in Engineering Design
- 2 - ME 4440 Mechanical Engineering Lab. III<sup>2</sup> or
- 3 - Technical Requirement<sup>4</sup>
- 6 - Arts and Humanities Requirement<sup>1</sup> or
- 6 - Social Science Requirement<sup>1</sup>
- 3 - Mechanical Engineering Technical Requirement<sup>4</sup>

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125 Total Semester Hours

<sup>1</sup>See Policy on Humanities and Social Sciences for Engineering Curricula. Six of these credit hours must also satisfy General Education Cross-Cultural Awareness and Science and Technology in Society Requirements. These requirements may be filled in any order.

<sup>2</sup>Both are required but may be taken in either semester.

<sup>3</sup>Select from MATH 3020 or STAT 4110

<sup>4</sup>See advisor. Select from department-approved list.

#### Notes:

1. Enrollment Policy (see Web Site for Complete Statement of Department Policy): A student is allowed to enroll in any ME course only when all prerequisites, as defined by current official listings for that course, have been passed with a grade of C or higher.

2. No student may exceed three attempts to complete successfully ME 2010, 2030, or 2040. Registration for a third attempt to complete one of these ME courses requires the approval of the undergraduate coordinator in the Department of Mechanical Engineering. A grade of W counts as an unsuccessful attempt at completing the course.

3. For students repeating an ME course, registration preference will be given to students in a degree-granting engineering major whose curriculum requires the course in question.

4. To change majors into the Mechanical Engineering degree program, students must have a minimum cumulative grade-point average of 2.60 or higher at Clemson and earned a C or better in each course in the General Engineering freshman curriculum, EXCLUDING the Arts and Humanities/Social Science requirements.

## SCIENCE PROGRAMS

The College of Engineering and Science offers curricula leading to the Bachelor of Science in Chemistry, Computer Information Systems, Computer Science, Geology, Mathematical Sciences, and Physics. The Bachelor of Arts is offered in Chemistry, Computer Science, Mathematical Sciences, and Physics.

The science departments in the College work closely with the other academic departments in the University, including such disciplines as economics and management as well as engineering. This allows students in the sciences great flexibility and responsibility in designing their own programs.

### Bachelor of Science Curricula

The Bachelor of Science degree prepares graduates for professional employment or graduate study in the chosen science discipline. BS curricula are more highly structured than BA curricula but nonetheless offer opportunity for students to pursue a minor or secondary area of interest.

### Bachelor of Arts Curricula

The curricula leading to the Bachelor of Arts degree are designed to meet the needs of students who desire a broad general education. They require a minor (or a second major) as well as the major concentration. A major requires a minimum of 24 credits from courses above the sophomore level, including or in addition to courses specified by the major department. In some major disciplines, certain prescribed courses at the sophomore level are counted toward the 24-credit requirement.

Students have a large degree of flexibility and responsibility in selecting a minor from those listed on page 112. Courses for these minors are to be selected in consultation with the appropriate department.

## CHEMISTRY

### Bachelor of Science

Chemistry, an experimental discipline based on observation guided by molecular theory, is of fundamental importance in much of modern science and technology. Its molecular concepts form the basis for ideas about complex material behavior. Due to the fundamental nature and extensive application of chemistry, an unusually large variety of challenging opportunities to contribute in the science-oriented community are open to students whose education is built around the principles of this discipline.

The Chemistry curriculum, through the career requirement options and the large number of electives, provides students the opportunity to select a coherent program of study beyond the basic courses. Career requirement options are provided for students anticipating graduate study in chemistry or related fields; employment following the BS degree in laboratory, production, technical sales, or management positions; professional studies (e.g., medicine); chemical physics; geochemistry; and employment in fields requiring extensive preparation in courses other than sciences (e.g., patent law and technical writing). Significant features of the curriculum are the student's extensive participation in experimental work and the opportunity to take part in a research investigation during the junior and senior years.

#### Freshman Year

##### First Semester

- 4 - CH 1010 General Chemistry
- 1 - CH 141Q Chemistry Orientation
- 3 - ENGL 1030 Accelerated Composition
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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##### Second Semester

- 4 - CH 1020 General Chemistry
- 2 - CH 1520 Chemistry Communication I
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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#### Sophomore Year

##### First Semester

- 3 - CH 2230 Organic Chemistry
- 1 - CH 2270 Organic Chemistry Lab.
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II
- 1 - PHYS 2230 Physics Lab. II
- 4 - Foreign Language Requirement<sup>2</sup>

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##### Second Semester

- 3 - CH 2050 Introduction to Inorganic Chemistry
- 3 - CH 2240 Organic Chemistry
- 1 - CH 2280 Organic Chemistry Lab.
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 3 - PHYS 2220 Physics with Calculus III
- 1 - PHYS 2240 Physics Lab. III

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### Junior Year

#### First Semester

- 3 - CH 3130 Quantitative Analysis
- 2 - CH 3150 Quantitative Analysis Lab.
- 3 - CH 3310 Physical Chemistry
- 1 - CH 3390 Physical Chemistry Lab.
- 3 - ENGL 3140 Technical Writing
- 3 - Elective

15

#### Second Semester

- 3 - CH 3320 Physical Chemistry
- 1 - CH 3400 Physical Chemistry Lab.
- 3 - CH 3600 Chemical Biology<sup>4</sup>
- 3 - CH 4110 Instrumental Analysis
- 2 - CH 4120 Instrumental Analysis Lab.
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>

15

### Senior Year

#### First Semester

- 3 - CH 4020 Inorganic Chemistry
- 3 - CH 4430 Research Problems
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - Chemistry Requirement<sup>3</sup>
- 3 - Elective

15

#### Second Semester

- 2 - CH 4030 Advanced Synthetic Techniques
- 3 - CH 4440 Research Problems
- 3 - CH 4500 Chemistry Capstone
- 1 - CH 4520 Chemistry Communication II
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
- 3 - Chemistry Requirement<sup>3</sup>

15

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>One semester (through 1020) in any modern foreign language is required.

<sup>3</sup>See advisor.

<sup>4</sup>BCHM 3050 may be substituted for CH 3600.

## CHEMISTRY

### Bachelor of Arts

#### Freshman Year

##### First Semester

- 4 - CH 1010 General Chemistry
- 1 - CH 1410 Chemistry Orientation
- 3 - ENGL 1030 Accelerated Composition
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

15

##### Second Semester

- 4 - CH 1020 General Chemistry
- 2 - CH 1520 Chemistry Communication I
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>

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**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2210 Physics with Calculus II
  - 4 - Foreign Language Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - CH 2050 Introduction to Inorganic Chemistry
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 6 - Arts and Humanities Requirement<sup>1</sup> or  
6 - Social Science Requirement<sup>1</sup>
  - 4 - Foreign Language Requirement<sup>2</sup>
- 17

**Junior Year****First Semester**

- 3 - CH 3130 Quantitative Analysis
  - 1 - CH 3170 Quantitative Analysis Lab.
  - 3 - CH 3310 Physical Chemistry
  - 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
  - 3 - Foreign Language Requirement<sup>2</sup>
  - 3 - Minor Requirement
- 16

**Second Semester**

- 3 - CH 3320 Physical Chemistry
  - 3 - ENGL 3140 Technical Writing
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Foreign Language Requirement<sup>2</sup>
  - 3 - Minor Requirement
- 15

**Senior Year****First Semester**

- 3 - Arts and Humanities Requirement<sup>1</sup> or  
3 - Social Science Requirement<sup>1</sup>
  - 3 - Chemistry Requirement<sup>3</sup>
  - 3 - Minor Requirement
  - 6 - Elective
- 15

**Second Semester**

- 3 - CH 4500 Chemistry Capstone
  - 1 - CH 4520 Chemistry Communication II
  - 3 - Chemistry Requirement<sup>3</sup>
  - 6 - Minor Requirement
- 13

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>Four semesters (through 2020) of the same modern foreign language are required.

<sup>3</sup>See advisor.

**COMPUTER INFORMATION SYSTEMS****Bachelor of Science**

The Computer Information Systems degree program is oriented toward computer applications in management-related problems. The program emphasizes functional areas of management, including accounting, production, marketing, and finance

and the applications of computers in these areas. The curriculum is designed to prepare students for careers in areas such as systems design and analysis, applications programming, database administration, and information retrieval, as well as for continued study toward an advanced degree.

Students who change majors into Computer Information Systems must have a cumulative grade-point average of 2.0 or higher.

Additional information can be found at [www.cs.clemson.edu](http://www.cs.clemson.edu).

**Freshman Year****First Semester**

- 4 - CPSC 1010 Computer Science I
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1020 Intro. to Mathemat. Analysis<sup>1</sup> or  
4 - MATH 1060 Calculus of One Variable I<sup>1</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
  - 1 - Elective<sup>1</sup>
- 15

**Second Semester**

- 4 - CPSC 1020 Computer Science II
  - 3 - MATH 2070 Multivariable Calculus<sup>3</sup> or  
4 - MATH 1080 Calculus of One Variable II<sup>1</sup>
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
  - 3 - Natural Science Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>3</sup>
  - 1 - Elective<sup>1</sup>
- 17

**Sophomore Year****First Semester**

- 3 - CPSC 2070 Discrete Structures for Computing
  - 4 - CPSC 2120 Algorithms and Data Structures
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
  - 3 - Oral Communication Requirement<sup>4</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 16

**Second Semester**

- 3 - CPSC 2150 Software Development Foundations
  - 4 - CPSC 2310 Intro. to Computer Organization
  - 1 - CPSC 2910 Seminar in Professional Issues I
  - 3 - MGT 2010 Principles of Management
  - 3 - STAT 3090 Introductory Business Statistics<sup>5</sup>
- 14

**Junior Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
  - 3 - CPSC 2200 Microcomputer Applications
  - 3 - CPSC 3220 Introduction to Operating Systems
  - 3 - CPSC 3720 Intro. to Software Engineering
  - 3 - Writing Requirement<sup>6</sup>
- 15

**Second Semester**

- 3 - ACCT 2020 Managerial Accounting Concepts
  - 3 - CPSC 3600 Networks and Network Program.
  - 3 - CPSC 3710 Systems Analysis or  
3 - MGT 4520 Systems Analysis and Design
  - 3 - ECON 2110 Principles of Microeconomics
  - 3 - Computer Science Requirement<sup>7</sup>
- 15

**Senior Year****First Semester**

- 3 - CPSC 4200 Computer Security Principles or  
3 - CPSC 4240 System Admin. and Security
  - 3 - CPSC 4620 Database Management Systems
  - 3 - CPSC 4910 Seminar in Professional Issues II
  - 3 - Business Requirement<sup>8</sup>
  - 3 - Computer Science Requirement<sup>7</sup>
- 15

**Second Semester**

- 3 - MGT 3120 Decision Models for Management
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Business Requirement<sup>8</sup>
  - 3 - Computer Science Requirement<sup>7</sup>
  - 3 - Information Systems Requirement<sup>9</sup>
- 15

122 Total Semester Hours

<sup>1</sup>Select either the MATH 1020/2070, 1060/2070 or 1060/1080 sequences. Students who select the 1060/1080 sequence will have satisfied the two elective credits in the freshman year.

<sup>2</sup>Select from courses in BIOL, BCHM, CH, GEOL, MICR, PHYS; or ENSP 2000. At least one course must include a laboratory and satisfy the Natural Science General Education Requirement.

<sup>3</sup>See General Education Requirements.

<sup>4</sup>Select from: COMM 1500, 2500, HON 2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

<sup>5</sup>MATH 2060 and 3020, or STAT 2300 and 3300 may be substituted.

<sup>6</sup>Select from: ENGL 3040, 3120, 3140, 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4010, 4020.

<sup>7</sup>Select from 3000-level or higher CPSC courses. No more than three credits of CPSC 3990 or 4810 may be used, and no more than six credits of CPSC 4820 may be used.

<sup>8</sup>Select from MGT 3900, 4000 and FIN 3060.

<sup>9</sup>Select from MGT 4520, 4540, 4550, 4560, or any 4000-level CPSC course. CPSC 4810 may not be used.

Notes:

1. For graduation, a candidate for the BS degree in Computer Information Systems must have earned a grade of C or better in each CPSC course applied to the non-elective requirements of the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MATH courses) before enrolling in the next CPSC course.

3. General Education Cross-Cultural Awareness and Science and Technology in Society requirements must be satisfied.

**COMPUTER SCIENCE****Bachelor of Science**

The Computer Science program is oriented toward design, implementation, and application of software systems to solve information processing problems. Emphasis areas outside computer science allow students to tailor the program to their individual needs and interests. This program is more technically oriented than the Computer Information Systems curriculum. It prepares students for employment in the computer software field or for continued study toward an advanced degree in computer science. This program is accredited by the Computing Accreditation Commission (CAC) of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700. Additional information can be found at [www.cs.clemson.edu](http://www.cs.clemson.edu).

Students who change majors into Computer Science must have a cumulative grade-point average of 2.0 or higher.



## Combined Bachelor's/Master's Plan

The School of Computing allows students to count up to nine hours of graduate credit (6000- and 8000-level courses) toward both the bachelor's and master's degrees. Students participating in this program must have a minimum grade-point average of 3.4 and be admitted to the Graduate School prior to registering for graduate courses. Details of the suggested curriculum and program information are available from the Department.

## Freshman Year

### First Semester

- 4 - CPSC 1010 Computer Science I
- 3 - ENGL 1030 Accelerated Composition
- 4 - MATH 1060 Calculus of One Variable I
- 4 - Natural Science Requirement<sup>1</sup>

15

### Second Semester

- 4 - CPSC 1020 Computer Science II
- 4 - MATH 1080 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 4 - Natural Science Requirement<sup>1</sup>

15

## Sophomore Year

### First Semester

- 3 - CPSC 2070 Discrete Structures for Computing
- 4 - CPSC 2120 Algorithms and Data Structures
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 3 - Natural Science Requirement<sup>1</sup>
- 3 - Oral Communication Requirement<sup>3</sup>

16

### Second Semester

- 3 - CPSC 2150 Software Development Foundations
- 4 - CPSC 2310 Intro. to Computer Organization
- 1 - CPSC 2910 Seminar in Professional Issues I
- 3 - STAT 3090 Introductory Business Statistics<sup>4</sup>
- 3 - Natural Science Requirement<sup>1</sup>
- 2 - Elective

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## Junior Year

### First Semester

- 3 - CPSC 3300 Computer Systems Organization
- 3 - CPSC 3600 Networks and Network Program.
- 3 - CPSC 3720 Intro. to Software Engineering
- 3 - MATH 3110 Linear Algebra
- 3 - Social Science Requirement<sup>2</sup>

15

### Second Semester

- 3 - CPSC 3220 Introduction to Operating Systems
- 3 - CPSC 3500 Foundations of Computer Science
- 3 - CPSC 3620 Distributed and Cluster Computing
- 3 - Arts and Humanities Requirement<sup>5</sup> or
  - 3 - Social Science Requirement<sup>5</sup>

- 3 - Social Science Requirement<sup>2</sup>

15

## Senior Year

### First Semester

- 3 - CPSC 3520 Programming Languages
- 6 - Computer Science Requirement<sup>6</sup>
- 3 - Writing Requirement<sup>7</sup>
- 3 - Elective

15

## Second Semester

- 3 - CPSC 4910 Seminar in Professional Issues II
- 3 - Arts and Humanities Requirement<sup>5</sup> or
  - 3 - Social Science Requirement<sup>5</sup>
- 6 - Computer Science Requirement<sup>6</sup>
- 3 - Elective

15

122 Total Semester Hours

<sup>1</sup>Two-semester sequence in the same physical or biological science, each including a laboratory, is required. Select from BIOL 1030/1050, 1040/1060; 1100, 1110; CH 1010, 1020; GEOL 1010/1030 and 2020 or 1120/1140; PHYS 1220/1240, 2210/2230. The six remaining hours may be selected from BIOL, BCHM, CH, GEOL, MICR, PHYS; or ENSP 2000.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>One course of: COMM 1500, 2500, HONS 2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

<sup>4</sup>MATH 2060 and 3020; or STAT 2300 and 3300 may be substituted.

<sup>5</sup>Select from courses in AAH, ANTH, ART, CHIN, COMM, DANC, EAS, ECON, ENGL, FR, GEOG, GER, HIST, HUM, ITAL, JAPN, MUSC, PA, PAS, PHIL, POSC, PSYC, REL, RUSS, SOC, SPAN, THEA, WS.

<sup>6</sup>Select from 3000-level or higher CPSC courses. No more than three credits of CPSC 3990 or 4810 may be applied to this requirement, and no more than six credits of CPSC 4820 may be applied. Up to three credits of approved 3000-level or higher MATH or ECE courses may be substituted.

<sup>7</sup>One course of: ENGL 3040, 3120, 3140 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4040, 4020.

### Notes:

1. For graduation, a candidate for the BS degree in Computer Science must have earned a grade of C or better in each CPSC course applied to the non-elective requirements of the degree.
2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MATH courses) before enrolling in the next CPSC course.
3. General Education Cross-Cultural Awareness and Science and Technology in Society requirements must be satisfied.

# COMPUTER SCIENCE

## Bachelor of Arts

The Bachelor of Arts in Computer Science is ideal for students interested in acquiring a broad-based liberal arts education that includes a strong and solid understanding of computer science. The curriculum is oriented toward design, implementation, and application of computer software systems to solve information processing problems. The program prepares students for employment in the computer software field or for continued study toward an advanced degree in computer science. Additional information can be found at [www.cs.clemson.edu](http://www.cs.clemson.edu).

Students who change majors into Computer Science must have a cumulative grade-point average of 2.0 or higher.

## Freshman Year

### First Semester

- 4 - CPSC 1010 Computer Science I
- 3 - ENGL 1030 Accelerated Composition
- 3 - MATH 1020 Intro. to Mathemat. Analysis<sup>1</sup> or
  - 4 - MATH 1060 Calculus of One Variable I<sup>1</sup>
- 4 - Foreign Language Requirement<sup>2</sup>
- 1 - Elective<sup>1</sup>

15

## Second Semester

- 4 - CPSC 1020 Computer Science II
- 3 - MATH 2070 Multivariable Calculus<sup>1</sup> or
  - 4 - MATH 1080 Calculus of One Variable II<sup>1</sup>
- 3 - Arts and Humanities (Non-Lit.) Req.<sup>3</sup>
- 4 - Foreign Language Requirement<sup>2</sup>
- 1 - Elective<sup>1</sup>

15

## Sophomore Year

### First Semester

- 3 - CPSC 2070 Discrete Structures for Computing
- 4 - CPSC 2120 Algorithms and Data Structures
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Foreign Language Requirement<sup>2</sup>
- 3 - Oral Communication Requirement<sup>4</sup>

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### Second Semester

- 3 - CPSC 2150 Software Development Foundations
- 4 - CPSC 2310 Intro. to Computer Organization
- 1 - CPSC 2910 Seminar in Professional Issues I
- 3 - Foreign Language Requirement<sup>2</sup>
- 4 - Natural Science Requirement<sup>5</sup>

15

## Junior Year

### First Semester

- 6 - Computer Science Requirement<sup>6</sup>
- 3 - Mathematical Sciences Requirement<sup>7</sup>
- 3 - Minor Requirement
- 3 - Natural Science Requirement<sup>5</sup>

15

### Second Semester

- 3 - Computer Science Requirement<sup>6</sup>
- 6 - Minor Requirement
- 3 - Social Science Requirement<sup>3</sup>
- 3 - Writing Requirement<sup>8</sup>

15

## Senior Year

### First Semester

- 6 - Computer Science Requirement<sup>6</sup>
- 3 - Departmental Humanities Requirement<sup>9</sup>
- 3 - Minor Requirement
- 3 - Social Science Requirement<sup>3</sup>

15

### Second Semester

- 3 - CPSC 4910 Seminar in Professional Issues II
- 3 - Computer Science Requirement<sup>6</sup>
- 3 - Fine Arts Requirement<sup>10</sup>
- 3 - Minor Requirement
- 3 - Elective

15

121 Total Semester Hours

<sup>1</sup>Select either the MATH 1020/2070, 1060/2070, or 1060/1080 sequence. Students who select the MATH 1060/1080 sequence will have satisfied the elective credits in the freshman year. Students interested in computer graphics should select the MATH 1060/1080 sequence.

<sup>2</sup>Four semesters (through 2020) in the same modern foreign language are required.

<sup>3</sup>See General Education Requirements.

<sup>4</sup>One course of: COMM 1500, 2500, HONS 2230; or the cluster of courses AS 3090, 3100, 4090, 4100; or ML 1010, 1020.

<sup>5</sup>Select from courses in BIOL, BCHM, CH, GEOL, MICR, PHYS; or ENSP 2000. At least one course must include a laboratory and satisfy the Natural Science General Education Requirement.

<sup>6</sup>Select from CPSC courses numbered 3000-level or higher. No more than three credits of CPSC 3990 or 4810 may be applied to this requirement, and no more than six credits of CPSC 4820 may be applied. Up to three credits of approved 3000-level or higher MATH or ECE courses may be substituted.

<sup>7</sup>MATH 2060 and 3020; or MATH 3110; or STAT 3090; or STAT 2300 and 3300. MATH 3110 is required for all graphics courses.

<sup>8</sup>One course of: ENGL 3040, 3120, 3140, 3150, 3160, 3330; AS 3090, 3100, 4090, 4100; ML 3010, 3020, 4010, 4020.

<sup>9</sup>Select from courses in AAH, ANTH, ART, CHIN, DANC, ENGL, FR, GER, HUM, ITAL, JAPN, MUSC, PA, PHIL, REL, RUSS, SPAN, THEA.

<sup>10</sup>MUSC 2100 or any course in AAH, ART, or THEA.

#### Notes:

1. For graduation, a candidate for the BA degree in Computer Science must have earned a grade of C or better in each CPSC course applied to the non-elective requirements for the degree.

2. A grade of C or better must be earned in all prerequisite courses (including CPSC and MATH courses) before enrolling in the next CPSC course.

3. General Education Cross-Cultural Awareness and Science and Technology in Society requirements must be satisfied.

## GEOLOGY

### Bachelor of Science

Geology is the study of the Earth. It is an applied science that integrates principles from physics, chemistry, biology, engineering, and other disciplines to better understand the natural processes and human influences that shape our planet. Geology helps people deduce Earth's natural history, locate natural resources needed to support society, develop sustainable approaches to energy and resource management, and predict, assess, and manage global change and natural disasters.

Employment opportunities for geologists are numerous and varied. Examples include environmental and engineering consulting firms, energy exploration and production firms, mineral and metal industries, municipal, state, and federal governments, natural resource conservation organizations, and water authorities. Many students go on to graduate school in the geosciences, environmental sciences, or related fields. Geology is a professional degree and state certification as a Registered Professional Geologist is obtainable. Given the various career options that are possible, students are provided the opportunity to develop a broad range of skills and knowledge within the Geology program.

The Geology curriculum provides students with a well-rounded background in geology and related fields and is built around three critical themes: (1) appreciation for spatial and temporal scales, (2) knowledge of earth materials and compositions of environmental systems, and (3) understanding of geological and environmental processes. While providing solid fundamentals within science and engineering, the Geology program is also flexible, allowing students to choose among many electives to tailor their education to specific interests and career goals. The program has been carefully designed to help students develop quantitative and other critical skills, while familiarizing them with the topics, technologies, and resources needed for a variety of career paths in the geosciences. As students progress through the program they have

multiple opportunities to enhance their skills of observation, computation, synthesis, communication and problem solving. Because Geology is inherently a field-based discipline, all students are required to take one or more courses that provide them with field experience. All Geology majors also participate in a multi-semester research program that provides them with hands-on experiences conducting geologic research and solving real-world problems in their chosen area of interest. It is also possible for Geology majors to pursue the Engineering Cluster Minor; students interested in this pathway should consult with their advisor early in their program of study.

Within the Geology curriculum, students who are particularly interested in environmental or water resources issues may choose to specialize in the Environmental Science Concentration or the Hydrogeology Concentration. These two concentrations provide more structured course pathways through the curriculum and help prepare students for careers in these specific areas. The Environmental Science Concentration in Geology focuses on environmental aspects of geoscience and is well suited for students interested in topics such as environmental policy, natural hazard assessment and remediation, evaluation of land use impacts, understanding geochemical cycles, and environmental systems analysis. This concentration provides a rigorous background in the sciences so that students can scientifically address environmental issues and integrate material from several fields to solve complex environmental problems. The Hydrogeology Concentration in Geology is designed for students who want to specialize in areas such as surface- and ground-water systems, treatment of water and cleanup of contaminated sites, contaminant flow and fluid transport, and water resource sustainability.

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - GEOL 1010 Physical Geology
- 1 - GEOL 1030 Physical Geology Lab.
- 4 - MATH 1060 Calculus of One Variable I

15

#### Second Semester

- 4 - CH 1020 General Chemistry
- 3 - GEOL 1120 Earth Resources
- 4 - MATH 1080 Calculus of One Variable II
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>

17

### Sophomore Year

#### First Semester

- 3 - GEOL 2050 Mineralogy and Intro. Petrology
- 1 - GEOL 2070 Mineralogy and Intro. Petrology Lab.
- 1 - GEOL 2910 Introduction to Research I
- 3 - PHYS 1220 Physics with Calculus I
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Social Science Requirement<sup>1</sup>
- 3 - STEM Requirement<sup>2</sup>

17

### Second Semester

- 4 - GEOL 2020 Earth History
- 1 - GEOL 2920 Introduction to Research II
- 3 - Quantative Science Requirement<sup>3</sup>
- 7 - STEM Requirement<sup>2</sup>

15

### Junior Year

#### First Semester

- 4 - GEOL 3020 Structural Geology
- 2 - GEOL 3910 Research Methods I
- 3 - Quantative Science Requirement<sup>3</sup>
- 3 - STEM Requirement<sup>2</sup>

12

#### Second Semester

- 2 - GEOL 3920 Research Methods II
- 7 - Geology Requirement<sup>4</sup>
- 3 - STEM Requirement<sup>2</sup>

12

### Summer

- 6 - Field Experience<sup>5</sup>

### Senior Year

#### First Semester

- 3 - GEOL 4910 Research Synthesis I
- 4 - Geology Requirement<sup>4</sup>
- 6 - STEM Requirement<sup>2</sup>

13

#### Second Semester

- 3 - GEOL 4920 Research Synthesis II
- 4 - Geology Requirement<sup>4</sup>
- 6 - STEM Requirement<sup>2</sup>

13

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>2</sup>Twenty-eight credit hours selected from department approved list. No more than 14 hours below the 3000-level and no more than eight hours below the 2000-level. Courses may not be used to satisfy any other requirement.

<sup>3</sup>Select from department-approved list. Courses may not be used to satisfy any other requirement.

<sup>4</sup>Fifteen credit hours. Select from GEOL 3130, 3180, 4050, 4090, 4150, 4210, or (CE) 4820. Only excess hours may be used to satisfy STEM requirement hours.

<sup>5</sup>GEOL 4750, or other six-credit summer geology field camp, or a combination of GEOL 2750 plus a three-credit field course in geology or other approved discipline. Students desiring to become registered professional geologists should take a six-credit summer field camp in geology/hydrogeology.

## ENVIRONMENTAL SCIENCE CONCENTRATION

### Freshman Year

#### First Semester

- 4 - CH 1010 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - GEOL 1010 Physical Geology
- 1 - GEOL 1030 Physical Geology Lab.
- 4 - MATH 1060 Calculus of One Variable I

15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 3 - GEOL 1120 Earth Resources
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 17

**Sophomore Year****First Semester**

- 3 - BIOL 1030 General Biology I
  - 1 - BIOL 1050 General Biology Lab. I
  - 3 - ENSP 2000 Intro. to Environmental Science
  - 3 - GEOL 2050 Mineralogy and Intro. Petrology
  - 1 - GEOL 2070 Mineral. and Intro. Petrology Lab.
  - 1 - GEOL 2910 Introduction to Research I
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - BIOL 1040 General Biology II
  - 1 - BIOL 1060 General Biology Lab. II
  - 3 - CH 2010 Survey of Organic Chemistry or  
3 - CH 2230 Organic Chemistry
  - 4 - GEOL 2020 Earth History
  - 1 - GEOL 2920 Introduction to Research II
  - 3 - PHYS 1220 Physics with Calculus I
- 15

**Junior Year****First Semester**

- 3 - GEOL 3000 Environmental Geology
  - 4 - GEOL 3020 Structural Geology
  - 2 - GEOL 3910 Research Methods I
  - 4 - GEOL 4150 Analysis of Geological Processes<sup>2</sup>
- 13

**Second Semester**

- 3 - GEOL 3180 Introduction to Geochemistry
  - 2 - GEOL 3920 Research Methods II
  - 3 - GEOL 4210 GIS Applications in Geology
  - 3 - MATH 3020 Statistics for Science and Engr. or  
3 - STAT 2300 Statistical Methods I
  - 4 - Environmental Science Requirement<sup>3</sup>
- 15

**Summer**

- 6 - Field Experience<sup>4</sup>

**Senior Year****First Semester**

- 3 - ENSP 4000 Studies in Environmental Science
  - 3 - GEOL (CE) 4820 Groundwater and  
Contaminant Transport
  - 3 - GEOL 4910 Research Synthesis I
  - 3 - Social Science Requirement<sup>1</sup>
- 12

**Second Semester**

- 3 - GEOL 4920 Research Synthesis II
  - 10 - Environmental Science Requirement<sup>3</sup>
- 13

121 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.<sup>2</sup>MATH 2060 may be substituted.<sup>3</sup>Total of 14 credit hours selected from department approved list. No more than eight hours below the 3000-level. Courses cannot be used to satisfy any other requirement.

<sup>4</sup>GEOL 4750 or a combination of GEOL 2750 plus a three credit hour field course in geology, ecology or other approved discipline. Students desiring to become registered professional geologists should take a six-credit hour summer field camp in geology/hydrogeology.

**HYDROGEOLOGY  
CONCENTRATION****Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - GEOL 1010 Physical Geology
  - 1 - GEOL 1030 Physical Geology Lab.
  - 4 - MATH 1060 Calculus of One Variable I
- 15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 3 - GEOL 1120 Earth Resources
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 17

**Sophomore Year****First Semester**

- 3 - GEOL 2050 Mineralogy and Intro. Petrology
  - 1 - GEOL 2070 Mineral. and Intro. Petrology Lab.
  - 1 - GEOL 2910 Introduction to Research I
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab I
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Hydrogeology Requirement<sup>2</sup>
- 15

**Second Semester**

- 4 - GEOL 2020 Earth History
  - 1 - GEOL 2920 Introduction to Research II
  - 3 - MATH 3020 Statistics for Science and Engr. or  
3 - STAT 2300 Statistical Methods I
  - 3 - PHYS 2210 Physics with Calculus II
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Hydrogeology Requirement<sup>2</sup>
- 17

**Junior Year****First Semester**

- 3 - GEOL 3000 Environmental Geology
  - 4 - GEOL 3020 Structural Geology
  - 2 - GEOL 3910 Research Methods I
  - 4 - GEOL 4150 Analysis of Geological Processes<sup>3</sup>
- 13

**Second Semester**

- 4 - GEOL 3130 Sedimentology and Stratigraphy
  - 3 - GEOL 3180 Introduction to Geochemistry
  - 2 - GEOL 3920 Research Methods II
  - 3 - GEOL 4210 GIS Applications in Geology
- 12

**Summer**

- 6 - GEOL 4750 Summer Geology Field Camp

**Senior Year****First Semester**

- 3 - GEOL (CE) 4820 Groundwater and  
Contaminant Transport
  - 3 - GEOL 4910 Research Synthesis I
  - 6 - Hydrogeology Requirement<sup>2</sup>
- 12

**Second Semester**

- 3 - EES 4010 Environmental Engineering
  - 4 - GEOL 4050 Surficial Processes
  - 4 - GEOL 4090 Subsurface Methods
  - 3 - GEOL 4920 Research Synthesis II
- 14

121 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.<sup>2</sup>Total of 12 credit hours selected from department-approved list. Courses may not be used to satisfy any other requirement.<sup>3</sup>MATH 2060 may be substituted.**MATHEMATICAL SCIENCES**

The Mathematical Sciences curriculum is designed to be versatile. Students gain a broad knowledge of mathematical concepts and methods that are applicable in sciences, engineering, business, industry, and other professions requiring a strong mathematical background. In addition to the basic courses that provide necessary mathematical skills, the curriculum allows students to select an emphasis area or concentration, providing an introduction to a specific area where mathematics is used. These are Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Biology, Computer Science, Operations Research/Management Science, and Statistics.

In addition to the overall goal of preparing students to cope with a variety of mathematical problems, the curriculum seeks to provide an adequate background for students who plan to pursue graduate study or positions in business, industry, or government. Students electing the Biology Concentration will have the necessary preparation for entering medical school. More information about the degree program can be found at [www.clemson.edu/ces/departments/math](http://www.clemson.edu/ces/departments/math).

All mathematical sciences majors are required to complete a capstone experience that provides an opportunity to pursue research, independent study, or an approved internship under the direction of a faculty member, or the opportunity to study mathematical models in some area of the mathematical sciences. The capstone experience requires a written report (thesis, computer code, project description, intern experience, etc.) and an oral or poster presentation by each student.

**Combined Bachelor's/Master's Plan**

Under this plan, students may reduce the time necessary to earn both degrees by applying up to 12 graduate credits to both undergraduate and graduate program requirements. Students are encouraged to obtain the specific requirements for pursuing the combined degree from the Department of Mathematical Sciences [www.clemson.edu/ces/departments/math](http://www.clemson.edu/ces/departments/math), as early as possible in their undergraduate program. Enrollment guidelines and procedures can be found under *Academic Regulations* in this catalog.

**Bachelor of Science****Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Foreign Language Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 16

**Second Semester**

- 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 1220 Physics with Calculus I
  - 3 - Computer Science Requirement<sup>4</sup>
  - 3 - Cross-Cultural Awareness Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 16

**Sophomore Year****First Semester**

- 4 - MATH 2060 Calculus of Several Variables
  - 1 - MATH 2500 Intro. to Mathematical Sciences
  - 3 - MATH 3190 Introduction to Proof
  - 3 - MATH 3600 Intermediate Math. Computing
  - 4 - Natural Science Requirement<sup>5</sup>
- 15

**Second Semester**

- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - MATH 3020 Statistics for Science and Engr.
  - 3 - MATH 3110 Linear Algebra
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>5</sup>
- 17

**Junior Year****First Semester**

- 3 - MATH 4000 Theory of Probability
  - 3 - MATH 4400 Linear Programming
  - 3 - MATH 4530 Advanced Calculus I
  - 3 - Advanced Writing Requirement<sup>6</sup>
  - 3 - Technical Requirement<sup>7</sup>
- 15

**Second Semester**

- 3 - MATH 4120 Introduction to Modern Algebra
  - 3 - MATH 4540 Advanced Calculus II
  - 3 - Emphasis Area Requirement<sup>8</sup>
  - 3 - Technical Requirement<sup>7</sup>
  - 3 - Elective
- 15

**Senior Year****First Semester**

- 3 - Capstone Experience<sup>9</sup>
  - 6 - Emphasis Area Requirement<sup>8</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
  - 3 - Science and Tech. in Society Requirement<sup>2</sup>
- 15

**Second Semester**

- 1 - MATH 4920 Professional Development
  - 3 - Capstone Experience<sup>9</sup>
  - 3 - Emphasis Area Requirement<sup>8</sup>
  - 3 - Mathematical Sciences Requirement<sup>10</sup>
  - 3 - Elective
- 13

122 Total Semester Hours

<sup>1</sup>See General Education Requirements.<sup>2</sup>Three credits in any foreign language, including American Sign Language, numbered 1020 or above<sup>3</sup>See General Education Requirements. ECON 2110 is recommended. ECON 2110 is required for students whose emphasis area is Actuarial Science/Financial Mathematics.<sup>4</sup>CPSC 1010, 1110, 1610, or 2200<sup>5</sup>A two-semester sequence selected from the list of Natural Science with Laboratory General Education Requirements.<sup>6</sup>ENGL 3040, 3120, 3140 or 3150; or the cluster of courses AS 3090, 3100, 4090 and 4100; or the cluster of courses ML 3010, 3020, 4010, and 4020. ENGL 3140 is recommended.<sup>7</sup>CPSC 1020, 2100, 2120, ECON 2120, 4050, or FIN 3110; or any two natural science courses from General Education Natural Science Requirements (labs not required). Actuarial Science/Financial Mathematics requires ECON 2120 and FIN 3110; and Computer Science Emphasis Area requires CPSC 1020 and 2120, or CPSC 2100 and 2120.<sup>8</sup>Select from Abstract Mathematics, Actuarial Science/Financial Mathematics, Applied and Computational Mathematics, Computer Science, Operations Research/Management Science, or Statistics.<sup>9</sup>May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; or (3) completion of three credits of MATH 4500 and three credits of an additional course approved by the advisor. Students in Actuarial Science/Financial Mathematics Emphasis Area must take MATH 4070 and 4410. Students in the Operations Research/Management Science Emphasis Area must take MATH 4070 and 4420. Students in the Statistics Emphasis Area must take MATH 4070 and 4410.<sup>10</sup>Any 4000-level MATH or STAT course approved by the advisor.**Notes:**

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.

2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.

3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCOGA) by Total Credit Hours Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.**EMPHASIS AREAS****Abstract Mathematics<sup>1</sup>**

- 6 - Abstract Mathematics Requirement<sup>2</sup>
  - 6 - Mathematical Sciences Requirement<sup>3</sup>
- 12

**Actuarial Science/Financial Mathematics<sup>4</sup>**

- 3 - ACCT 2010 Financial Accounting Concepts
  - 1 - ACCT 2040 Accounting Procedures
  - 3 - FIN 3120 Financial Management II
  - 3 - MATH 4030 Intro. to Statistical Theory
  - 3 - MATH 4310 Theory of Interest
- 13

**Applied and Computational Mathematics**

- 3 - MATH 4340 Advanced Engineering Math.
  - 3 - MATH 4600 Intro. to Numerical Analysis I
  - 6 - Applications Area<sup>1</sup>
- 12

**Computer Science**

- 3 - CPSC 2150 Software Development Foundations
  - 9 - Computer Science 3000-Level Requirement<sup>5</sup>
- 12

**Operations Research/Management Science**

- 3 - IE 3860 Production Planning and Control
  - 4 - IE 4820 Systems Modeling
  - 3 - MATH 4410 Intro. to Stochastic Models
  - 3 - STAT 4020 Statistical Computing
- 13

**Statistics**

- 3 - MATH 4020 Statistical Theory and Meth. II
  - 3 - MATH 4030 Intro. to Statistical Theory
  - 3 - MATH 4060 Sampling Theory and Methods
  - 3 - STAT 4020 Statistical Computing
- 12

<sup>1</sup>See advisor.<sup>2</sup>MATH 4100, 4110, 4350, 4550, or 4560.<sup>3</sup>Any 4000-level MATH course<sup>4</sup>Students who want to take the Society of Actuaries "P" and "FM" exams are also advised to take MATH 4300 and 4320.<sup>5</sup>Any 3000- or 4000-level CPSC course**BIOLOGY CONCENTRATION****Freshman Year****First Semester**

- 5 - BIOL 1100 Principles of Biology I
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Foreign Language Requirement<sup>1</sup>
- 15

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - Computer Science Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>3</sup>
- 15

**Sophomore Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 4 - MATH 2060 Calculus of Several Variables
  - 1 - MATH 2500 Intro. to Mathematical Sciences
  - 3 - PHYS 2070 General Physics I
  - 1 - PHYS 2090 General Physics I Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>4</sup>
- 16

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - MATH 3110 Linear Algebra
  - 3 - PHYS 2080 General Physics II
  - 1 - PHYS 2100 General Physics II Lab.
- 15

**Junior Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Lab.
  - 3 - MATH 3190 Introduction to Proof
  - 3 - MATH 3600 Intermediate Math. Computing
  - 3 - Advanced Writing Requirement<sup>5</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>4</sup>
- 16

**Second Semester**

- 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Lab.
  - 3 - MATH 3020 Statistics for Science and Engr.
  - 3 - MATH 4400 Linear Programming
  - 3 - Mathematical Sciences Requirement<sup>6</sup>
  - 3 - Oral Communications Requirement<sup>7</sup>
- 16

**Senior Year****First Semester**

- 3 - MATH 4000 Theory of Probability
  - 3 - MATH 4530 Advanced Calculus I
  - 3 - Animal or Plant Diversity Requirement<sup>8</sup>
  - 3 - Capstone Experience<sup>9</sup>
  - 3 - Social Science Requirement<sup>4</sup>
- 
- 15

**Second Semester**

- 3 - MATH 4120 Introduction to Modern Algebra
  - 3 - MATH 4540 Advanced Calculus II
  - 1 - MATH 4920 Professional Development
  - 3 - Biological Sciences Requirement<sup>10</sup>
  - 3 - Capstone Experience<sup>9</sup>
- 
- 13

121 Total Semester Hours

<sup>1</sup>Three credits in any foreign language, including American Sign Language, numbered 1020 or above<sup>2</sup>CPS 1010, 1110, or 2200<sup>3</sup>See General Education Requirements. ECON 2000 or 2110 is recommended.<sup>4</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.<sup>5</sup>Select from ENGL 3040, 3120, 3140 or 3150; or the cluster of courses AS 3090, 3100, 4090 and 4100; or the cluster of courses ML 3010, 3020, 4010, and 4020.<sup>6</sup>Any 4000-level MATH or STAT course approved by advisor.<sup>7</sup>See General Education Requirements.<sup>8</sup>BIOL 3020, 3030, 3040, or 3050<sup>9</sup>May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; or (3) completion of three credits of MATH 4500 and three credits of an additional course approved by advisor.<sup>10</sup>BCHM 3010, GEN 3020/3030, MICR 3050, or any 3000-4000-level BIOL course**Notes:**

1. For graduation, a candidate for the BS degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.
3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCGPA) by Total Credit Hour Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.

**MATHEMATICAL SCIENCES****Bachelor of Arts****Freshman Year****First Semester**

- 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 1 - Elective
- 
- 14

**Second Semester**

- 4 - MATH 1080 Calculus of One Variable II
  - 3 - Computer Science Requirement<sup>3</sup>
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Science and Technology in Society Req.<sup>4</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 16

**Sophomore Year****First Semester**

- 4 - MATH 2060 Calculus of Several Variables
  - 1 - MATH 2500 Intro. to Mathematical Sciences
  - 3 - MATH 3600 Intermed. Math. Computing or 3 - EDSC 4370 Technology in Sec. Math.
  - 3 - Arts and Humanities (Literature) Requirement<sup>4</sup>
  - 3 - Cross-Cultural Awareness Requirement<sup>4</sup>
- 
- 14

**Second Semester**

- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - MATH 3020 Statistics for Science and Engr.
  - 3 - MATH 3110 Linear Algebra
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>4</sup>
  - 3 - Minor Requirement<sup>5</sup> or 3 - Second Major Requirement
- 
- 16

**Junior Year****First Semester**

- 3 - MATH 3190 Introduction to Proof
  - 3 - Advanced Writing Requirement<sup>6</sup>
  - 3 - Math Science Requirement<sup>7</sup>
  - 4 - Natural Science Requirement<sup>4</sup>
  - 3 - Elective
- 
- 16

**Second Semester**

- 3 - COMM 2500 Public Speaking
  - 3 - MATH 4120 Introduction to Modern Algebra
  - 3 - Minor Requirement<sup>5</sup> or 3 - Second Major Requirement
  - 4 - Natural Science Requirement<sup>4</sup>
  - 3 - Elective
- 
- 16

**Senior Year****First Semester**

- 3 - MATH 4530 Advanced Calculus I
  - 3 - Arts and Humanities Requirement<sup>4</sup> or 3 - Education Requirement<sup>8</sup>
  - 3 - Capstone Experience<sup>9</sup>
  - 3 - Minor Requirement<sup>5</sup> or 3 - Second Major Requirement
  - 3 - Math Science Requirement<sup>7</sup>
- 
- 15

**Second Semester**

- 1 - MATH 4920 Professional Development or 1 - EDF 4250 Instructional Tech. Strategies
  - 3 - Capstone Experience<sup>9</sup>
  - 3 - Math Science Requirement<sup>7</sup>
  - 6 - Minor Requirement<sup>5</sup> or 6 - Second Major Requirement
  - 2 - Elective
- 
- 15

122 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language, including American Sign Language, are required.<sup>2</sup>See General Education Requirements. ECON 2000 or 2110 is recommended.<sup>3</sup>CPS 1010, 1110, or 2200<sup>4</sup>See General Education Requirements.<sup>5</sup>See page 112 for approved minors.<sup>6</sup>Select from EDSC 2260, ENGL 3040, 3120, 3140, 3150; the cluster of AS 3090, 3100, 4090, and 4100; or the cluster of ML 3010, 3020, 4010, and 4020.<sup>7</sup>MATH 3080 or any 4000-level MATH or STAT course.<sup>8</sup>See advisor.<sup>9</sup>May be satisfied by (1) completion of six credits of MATH 4820; (2) completion of six credits of MATH 4910 or an approved substitution; (3) completion of three credits of MATH 4500 and three credits of an additional course approved by advisor; or (4) EDSC 4460 for students seeking a double major in Secondary Education-Mathematics.**Notes:**

1. For graduation, a candidate for the BA degree in Mathematical Sciences will be required to have a 2.0 or higher cumulative grade-point average in all required MATH courses.
2. A grade of C or better must be earned in all prerequisite courses before enrolling in the next MATH course.
3. Students who change majors to Mathematical Sciences must have achieved the Minimum Cumulative Grade-Point Average (MCGPA) by Total Credit Hour Level as defined in the Academic Regulations section of the *Undergraduate Announcements* and must have received a grade of C or better in all MATH courses taken.

**PHYSICS****Bachelor of Science**

Physics, the most fundamental of the natural sciences, forms the basis of study upon which the other branches of science are founded. Physics is concerned with the fundamental behavior of matter and energy. Classical physics encompasses the fields of mechanics, heat and thermodynamics, electricity and magnetism, acoustics and optics. Modern physics is concerned with the study of atoms and molecules, atomic nuclei, elementary particles and the properties of liquids, crystalline solids, and other materials, as well as the areas of relativity, cosmology, and the large-scale structure of the universe.

The undergraduate Physics curricula provide students with a strong background in the classical areas of physics, as well as an introduction to the more important aspects of modern physics. The BS curriculum is directed toward preparing students for graduate study ultimately leading to the PhD degree or toward research and development work in industrial or governmental laboratories. It also provides a good background for graduate study or industrial work in many areas or engineering physics and applied science.

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab I
- 
- 15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Lab. II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 
- 15

**Sophomore Year****First Semester**

- 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2220 Physics with Calculus III
  - 1 - PHYS 3000 Introduction to Research
  - 3 - PHYS 3250 Experimental Physics I
  - 4 - Foreign Language Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - PHYS 3110 Intro. to Meth. of Theoretical Phys.
  - 3 - PHYS 3260 Experimental Physics II
  - 4 - Foreign Language Requirement<sup>2</sup>
  - 1 - Elective
- 
- 15

**Junior Year****First Semester**

- 3 - PHYS 3120 Methods to Theoretical Physics II
  - 3 - PHYS 3150 Intro. to Computational Physics
  - 3 - PHYS 3210 Mechanics I
  - 3 - Emphasis Area Requirement<sup>3</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 
- 15

**Second Semester**

- 3 - PHYS 3220 Mechanics II
  - 3 - PHYS 4650 Thermodynamics and Statistical Mechanics
  - 3 - Emphasis Area Requirement<sup>3</sup>
  - 3 - Physics Writing Requirement<sup>4</sup>
  - 3 - Science Requirement<sup>5</sup>
- 
- 15

**Senior Year****First Semester**

- 3 - PHYS 4010 Senior Thesis
  - 3 - PHYS 4410 Electromagnetics I
  - 3 - PHYS 4550 Quantum Physics I
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Emphasis Area Requirement<sup>3</sup>
- 
- 15

**Second Semester**

- 3 - HIST 1720 The West and the World I or  
3 - HIST 1730 The West and the World II
  - 3 - PHYS 4420 Electromagnetics II
  - 3 - PHYS 4560 Quantum Physics II
  - 3 - Emphasis Area Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 15

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.<sup>2</sup>Two semesters (through 1020) in the same modern foreign language are required.<sup>3</sup>See advisor. Select from the following emphasis areas: Chemistry, Computer Science, Engineering, Environmental Engineering, Geology, Mathematical Sciences, or Physics and Astronomy. Twelve credit hours in one of these areas, with at least six at the 3000-4000 level, are required. Note: Requirements for a minor in one of these areas might be satisfied with three additional credits at the 3000-4000 level.<sup>4</sup>ENGL 3040, 3120, 3140, 3150, 3160, 3450, 3460, 3480, ML 4020, or THEA (ENGL) 3470<sup>5</sup>Any 2000-4000-level science course**BIOPHYSICS CONCENTRATION**

The Biophysics Concentration offers an excellent preparation for medical school or graduate work in biological sciences. It includes the flexibility of selecting courses in chemistry, biological sciences, physics, and mathematics. This concentration also provides the necessary background for employment in industry, manufacturing, and instrumentation for clinical or molecular biology applications.

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab. I
- 
- 15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Lab. II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 
- 15

**Sophomore Year****First Semester**

- 5 - BIOL 1100 Principles of Biology
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2220 Physics with Calculus III
  - 1 - PHYS 3000 Introduction to Research
  - 3 - PHYS 3250 Experimental Physics I
- 
- 16

**Second Semester**

- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - PHYS 3110 Intro. to Meth. of Theoretical Phys.
  - 3 - PHYS 3260 Experimental Physics II or  
3 - Science Requirement<sup>5</sup>
  - 4 - Biophysics Requirement<sup>2</sup>
- 
- 14

**Junior Year****First Semester**

- 3 - PHYS 3120 Methods of Theoretical Physics II
  - 3 - PHYS 3150 Intro. to Computational Physics
  - 3 - PHYS 3210 Mechanics I
  - 3 - Biophysics Requirement<sup>2</sup>
  - 4 - Foreign Language Requirement<sup>3</sup>
- 
- 16

**Second Semester**

- 3 - PHYS 3220 Mechanics II
  - 3 - PHYS 4650 Thermodynamics and Statistical Mechanics
  - 3 - Biophysics Requirement<sup>2</sup>
  - 4 - Foreign Language Requirement<sup>3</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 
- 16

**Senior Year****First Semester**

- 3 - PHYS 4410 Electromagnetics I
  - 3 - PHYS 4550 Quantum Physics I
  - 3 - Arts and Humanities (Literature) Requirement
  - 3 - Biophysics Requirement<sup>2</sup>
  - 3 - Physics Writing Requirement<sup>4</sup>
- 
- 15

**Second Semester**

- 3 - HIST 1720 The West and the World I or  
3 - HIST 1730 The West and the World II
  - 3 - PHYS 4420 Electromagnetics II
  - 3 - PHYS 4560 Quantum Physics II
  - 3 - Biophysics Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 15

122 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.<sup>2</sup>Select from department-approved list of courses in biological sciences, chemistry, mathematical sciences, and physics. At least six credit hours must be in biological sciences.<sup>3</sup>Two semesters (through 1020) in same modern foreign language are required.<sup>4</sup>ENGL 3040, 3120, 3140, 3150, 3160, 3450, 3460, 3480, ML 4020, or THEA (ENGL) 3470<sup>5</sup>Any 2000-4000-level science course<sup>6</sup>An approved physics course may be substituted if CH 3310 and 3320 have been completed.**PHYSICS****Bachelor of Arts**

The Bachelor of Arts in Physics program is ideal for students interested in acquiring a broad-based liberal education that includes a strong and solid understanding of either science or a broad exposure to engineering with a strong physics foundation.

**Double Major in Physics/Science****Teaching—Physics**

The Bachelor of Arts Degree in Physics and Science Teaching—Physics prepares students for teaching physics on the secondary school level and for graduate studies in physics. See page 118 for the curriculum.

**Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab. I
- 
- 15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Lab. II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 
- 15

**Sophomore Year****First Semester**

- 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2220 Physics with Calculus III
  - 1 - PHYS 3000 Introduction to Research
  - 3 - PHYS 3250 Experimental Physics I
  - 4 - Foreign Language Requirement<sup>2</sup>
- 
- 15

**Second Semester**

- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - PHYS 3110 Intro. to Meth. of Theoretical Phys.
  - 4 - Foreign Language Requirement<sup>2</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
  - 1 - Elective
- 
- 15

**Junior Year****First Semester**

- 3 - PHYS 3150 Intro. to Computational Physics
- 3 - PHYS 3210 Mechanics I
- 3 - Foreign Language Requirement<sup>2</sup>
- 3 - Minor Requirement<sup>4</sup>
- 3 - Physics Writing Requirement<sup>3</sup>

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 15
**Second Semester**

- 3 - PHYS 3220 Mechanics II
- 3 - PHYS 4650 Thermodynamics and Statistical Mechanics
- 3 - Foreign Language Requirement<sup>2</sup>
- 3 - Minor Requirement<sup>3</sup>
- 3 - Social Science Requirement<sup>1</sup>

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 15
**Senior Year****First Semester**

- 3 - PHYS 4410 Electromagnetics I
- 3 - PHYS 4550 Quantum Physics I
- 6 - Minor Requirement<sup>3</sup>
- 3 - Physics Requirement<sup>5</sup>

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 15
**Second Semester**

- 3 - HIST 1720 The West and the World I *or*  
3 - HIST 1730 The West and the World II
- 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 3 - Minor Requirement<sup>3</sup>
- 3 - Physics Requirement<sup>5</sup>

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 3 - Elective

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 15

120 Total Semester Hours

<sup>1</sup>See General Education Requirements. Three of these credit hours must also satisfy the Science and Technology in Society Requirement.

<sup>2</sup>Four semesters (through 2020) in the same modern foreign language are required.

<sup>3</sup>ENGL 3040, 3120, 3140, 3150, 3160, 3450, 3460, 3480 ML 4020, or THEA (ENGL) 3470.

<sup>4</sup>See advisor.

<sup>5</sup>Any 3000- or 4000-level physics course

2014-15

## MINORS

Following are minors acceptable for students in the College of Engineering and Science. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Legal Studies
Adult/Extension Education	Management
Aerospace Studies	Management Information Systems
Agricultural Business Management	Mathematical Sciences
Agricultural Mechanization and Business	Microbiology
American Sign Language Studies	Military Leadership
Animal and Veterinary Sciences	Modern Languages
Anthropology	Music
Architecture	Natural Resource Economics
Art	Nonprofit Leadership
Athletic Leadership	Packaging Science
Biochemistry	Pan African Studies
Biological Sciences	Park and Protected Area Management
Business Administration	Philosophy
Chemistry	Physics
Cluster	Plant Pathology
Communication Studies	Political Science
Computer Science— <i>not open to Computer Information Systems majors</i>	Psychology
Crop and Soil Environmental Science	Public Policy
Digital Production Arts	Recreational Therapy
East Asian Studies	Religion
Economics	Russian Area Studies
Education	Science and Technology in Society
English	Screenwriting
Entomology	Sociology
Entrepreneurship	Spanish-American Area Studies
Environmental Science and Policy	Sustainability
Equine Industry	Theatre
Film Studies	Travel and Tourism
Financial Management	Turfgrass
Food Science	Urban Forestry
Forest Products	Wildlife and Fisheries Biology
Forest Resource Management	Women's Studies
Genetics	Writing
Geography	
Geology	
Global Politics	
Great Works	
History	
Horticulture	
Human Resource Management	
International Engineering and Science	

See pages 39-42 for details.



# COLLEGE OF HEALTH, EDUCATION AND HUMAN DEVELOPMENT

The College of Health, Education and Human Development provides students the means by which to pursue careers in the fields of nursing, education, health, and recreation management. The "Engaged College with a Personal Touch" is home to the academic programs offered by the School of Nursing; the Eugene T. Moore School of Education; the Department of Public Health Sciences; and the Department of Parks, Recreation and Tourism Management. The College also offers outreach services available through the Joseph F. Sullivan Center; the National Dropout Prevention Center; and the Outdoor Laboratory. Collaboration within the college between academics and community outreach services prepares students to be professional leaders in health, education, and recreation management. As with all programs at the University, students take course offerings from all colleges on campus to achieve the most complete education possible.

## EUGENE T. MOORE SCHOOL OF EDUCATION

The Eugene T. Moore School of Education is a transformative leader in systematically improving education, beginning at birth. The mission is to engage students in high quality applied research, professional learning, and immersive experiences. We prepare culturally competent scholar practitioners who promote the growth, education, and development of all individuals, with emphasis on underperforming schools and underserved communities across the state and nation. The School of Education prepares teachers for P-12 schools and higher education, and counselors, practitioners and leaders for P-12 schools, agencies and organizations.

## TEACHER EDUCATION PROGRAMS

The mission of the teacher preparation programs in the School of Education is to prepare critically reflective practitioners who:

- advocate for all learners,
- understand the importance of students' developmental and sociocultural contexts to learning,
- implement research-based instructional practices,
- utilize current disciplinary knowledge to integrate educational theory, research and practice,
- understand the influence of educational policies on their instruction and educational system,
- and stand firm in their conviction that all students can learn.

The Teacher Education Programs prepare teachers, provide professional services to education in South Carolina, and carry out basic and applied research in education. Curricula provide a broad general education through liberal arts and science courses, develop depth of knowledge in the teaching area, gain an understanding of the historical, philosophical, and psychological backgrounds of American education,

and acquire knowledge of and skill and experience in effective teaching techniques.

Field and clinical practice are integral to teacher preparation. The School of Education is committed to providing candidates with purposeful, challenging, and diverse experiences. It is through a range of diverse, carefully constructed, and challenging field-based experiences, in conjunction with classroom instruction, that candidates recognize the inherent dignity and value of all individuals, value social justice, and advocate on behalf of children and families.

The Teacher Education Programs in Early Childhood, Elementary, Special Education, and secondary school programs in Agriculture, English, Mathematics, Science, and Social Studies are accredited by the Council for the Accreditation of Educator Preparation (CAEP), the State of South Carolina, and discipline specialized national professional associations.

## Criminal Records Check

A criminal record could prevent a person enrolled in a teacher education program in South Carolina from being certified as a teacher in this state in accordance with State Board of Education guidelines.

Section 59-25-115 of the South Carolina Code of Laws specifies that before beginning the full-time clinical teaching experience in South Carolina, a teacher education candidate shall undergo a state criminal records check by the South Carolina Law Enforcement Division (SLED) and a national criminal records check supported by fingerprints by the Federal Bureau of Investigation (FBI). The applicant is responsible for the cost associated with the FBI background checks. Information reported relative to prior arrests or convictions will be reviewed by the State Department of Education, and the State Board of Education when warranted, according to board guidelines. A teacher education candidate with prior arrests or convictions of a serious nature that could affect his/her fitness to teach in the public schools of South Carolina may be denied the opportunity to complete the clinical teaching experience, and thus affect eligibility for initial teacher certification. An individual who is denied this opportunity as a result of prior arrests or convictions, after one year, may request reconsideration under guidelines established by the State Board of Education.

The criminal records check will be handled through the Office of Teacher Certification at the South Carolina State Department of Education and will be considered phase one of a person's application for a teaching credential. Provided the criminal records check is conducted within 18 months of the time the teacher candidate formally applies for a teaching certificate, the fingerprinting will not have to be repeated at the time of application. A graduate of a teacher education program applying for initial teacher certification must have completed the FBI fingerprint process within 18 months of formally applying for initial teacher certification or the fingerprint process must be repeated. The background check normally requires six (6) to eight (8) weeks to process. If the electronic fingerprints cannot be processed, the South Carolina State Department will inform the individual that it will be necessary to complete another electronic fingerprinting appointment.

Additionally, School of Education teacher candidates must complete a SLED check, a National Sex Offender check and a Tuberculosis (TB) test prior to beginning field and practicum experiences in public schools. Candidates complete field and practicum experiences prior to the full time clinical teaching experience. Therefore, the teacher education candidate will complete a SLED check for field and practicum experiences and a SLED and FBI background check for the full time clinical teaching experience.

## Admission

**Professional**—Application to the professional level of a program will be processed during the term in which a candidate is to complete 60 semester hours of work. At that time, the candidate will be notified of his/her status. Prior to admission, the candidate must have passed all areas of the Praxis CORE and have a minimum cumulative grade-point average of 2.75. A candidate may exempt the CORE by meeting minimum ACT or SAT requirements as determined by the South Carolina Department of Education.

**Directed Teaching/Teaching Internship**—A candidate shall apply to the field experience director prior to the semester in which block methods courses are to be scheduled. The following conditions must be met prior to registration for directed teaching: (1) admission to the professional level of a program; (2) completion of at least 95 semester hours; (3) a minimum cumulative grade-point average of 2.75. Candidates with a grade-point average of 2.50 to 2.74 may appeal to the Chair of Teacher Education, but exceptions are not common.

## Enrollment in Professional Courses

Enrollment in 4000-level professional education courses is contingent upon admission to the professional level as described above. Any candidate who desires to enroll in education courses must meet the cumulative grade-point requirements established for education majors. Appeals to continue taking classes may be made to the Chair of Teacher Education, but exceptions are not common.

## Change of Major

Changing majors into Education is highly competitive. Change of major decisions are made on an annual basis at the end of the fall semester. Applications are due December 1 and can only be obtained after meeting with a School of Education academic advisor. To apply, candidates must have a minimum grade-point average of 2.75.

## Graduation and Licensure

To graduate, a candidate must have scores for all state-mandated licensure exams on file with the School of Education's Office of Field Experience. Candidates must pass all required Praxis II tests, including the PLT (Principles of Learning and Teaching) test, before receiving recommendation for South Carolina teaching licensure.

## ATHLETIC LEADERSHIP AND EDUCATION MINORS

Two minors are offered in the School of Education – Education and Athletic Leadership. For more information on these minors and the requirements, please Minors, Programs and Degrees section of this catalog.

## ATHLETIC LEADERSHIP CERTIFICATE

Students completing a nationally recognized coaching certification through the Athletic Leadership Program at Clemson may be eligible to meet the requirements for Athletic Leadership Certification. For more information, contact the Coordinator of Athletic Leadership at (864) 656-0434. For more information, contact the Coordinator of Athletic Leadership at (864) 656-0434.

## Graduate Study

The School of Education offers a comprehensive set of programs at the masters, specialist and doctoral levels in advanced teacher preparation, educational leadership, counselor education (clinical mental health counseling and school counseling), student affairs and higher education, and human resource development. Browse the Clemson University Office of Graduate Programs or School of Education websites for more information.

## AGRICULTURAL EDUCATION

### Bachelor of Science

The College of Health, Education and Human Development and the College of Agriculture, Forestry and Life Sciences conduct a cooperative program to produce agricultural teachers (grades 9–12) for South Carolina. See page 43 for the curriculum.

## EARLY CHILDHOOD EDUCATION

### Bachelor of Arts

The Early Childhood Education curriculum prepares students for teaching positions on the pre-kindergarten and primary levels (Pre-K–3).

### Freshman Year

#### First Semester

- 2 - ED 1050 Orientation to Education
  - 3 - HIST 1730 The West and the World II
  - 3 - MATH 1150 Contemporary Mathematics for Elementary School Teachers I
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
- 15

#### Second Semester

- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - MATH 1160 Contemporary Mathematics for Elementary School Teachers II
  - 3 - PSYC 2010 Introduction to Psychology
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Elective
- 18

## Sophomore Year

### First Semester

- 3 - EDEC 3000 Foundations of Early Childhood Education<sup>3</sup>
  - 1 - EDEC 3010 Practicum in Early Childhood Settings I<sup>1</sup>
  - 3 - GEOG 1030 World Regional Geography
  - 3 - MATH 2160 Geometry for Elementary School Teachers
  - 3 - Arts and Humanities (Literature) Requirement<sup>4</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
- 17

### Second Semester

- 3 - EDEC 2200 Family, School, and Community Relationships<sup>5</sup>
  - 1 - EDEC 3020 Practicum in Early Childhood Settings<sup>5</sup>
  - 3 - EDF 3020 Educational Psychology
  - 3 - EDF 3340 Child Growth and Development
  - 3 - EDF 4800 Foundations of Digital Media and Learning
  - 3 - Arts and Humanities (Non-Lit) Requirement<sup>6</sup>
- 16

## Junior Year

### First Semester

- 1 - EDEC 3030 Practicum in Early Childhood Settings III<sup>7</sup>
  - 3 - EDEC 3360 Concepts of Play and Social Development of Infants and Young Children<sup>7</sup>
  - 3 - EDEL 3100 Arts in the Elementary School<sup>7</sup>
  - 3 - EDSP 3700 Introduction to Special Education<sup>7</sup>
  - 3 - EDSP 3750 Early Intervention for Infants and Children with Special Needs<sup>7</sup>
  - 3 - Elective
- 16

### Second Semester

- 1 - EDEC 3040 Practicum in Early Childhood Settings IV<sup>8</sup>
  - 3 - EDEC 4200 Early Childhood Science<sup>8</sup>
  - 3 - EDEC 4500 Early Childhood Curriculum and Social Studies Methods<sup>8</sup>
  - 3 - EDEL 3210 Physical Education Methods and Content for Classroom Teachers<sup>8</sup>
  - 3 - EDF 3010 Principles of American Education
  - 3 - EDLT 4580 Early Literacy: Birth–Kindergarten<sup>8</sup>
- 16

## Senior Year

### First Semester

- 3 - EDEC 4000 Observation and Assessment in Clinical Settings<sup>9</sup>
  - 3 - EDEC 4300 Early Childhood Mathematics<sup>9</sup>
  - 3 - EDEC 4400 Early Childhood Language Arts<sup>9</sup>
  - 3 - EDEC 4600 Critical Issues and Cultural Diversity in Early Childhood Education<sup>9</sup>
  - 3 - EDLT 4590 Teaching Reading in the Early Grades: K–3<sup>9</sup>
- 15

### Second Semester

- 9 - EDEC 4840 Directed Teaching in Early Childhood Education<sup>10</sup>
  - 3 - EDEC 4850 Early Childhood Capstone<sup>10</sup>
- 12

125 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in a modern foreign language are required. Spanish is recommended.

<sup>2</sup>One biological science and one physical science course, each with laboratory, must be selected from General Education Requirements. See advisor.

<sup>3</sup>Must be taken the fall semester of the sophomore year.

<sup>4</sup>ENGL 2120, 2130, 2140, or 2150

<sup>5</sup>Must be taken the spring semester of the sophomore year.

<sup>6</sup>See General Education Requirements.

<sup>7</sup>Must be taken the fall semester of the junior year.

<sup>8</sup>Must be taken the spring semester of the junior year.

<sup>9</sup>Must be taken the fall semester of the senior year.

<sup>10</sup>Must be taken the spring semester of the senior year.

## ELEMENTARY EDUCATION

### Bachelor of Arts

The Elementary Education curriculum prepares students for teaching on the elementary school level (grades 2–6). Students select one of two Emphasis Areas: Literacy, Culture and Diversity; or Mathematics and Science.

## LITERACY, CULTURE AND DIVERSITY EMPHASIS AREA

### Freshman Year

#### First Semester

- 4 - BIOL 1090 Introduction to Life Science
  - 2 - ED 1050 Orientation to Education
  - 3 - GEOG 1030 World Regional Geography
  - 3 - MATH 1150 Contemporary Mathematics for Elementary School Teachers I
  - 3 - Foreign Language Requirement<sup>1</sup>
- 15

#### Second Semester

- 3 - ENGL 1030 Accelerated Composition
  - 3 - HIST 1010 History of the United States *or*
  - 3 - HIST 1020 History of the United States
  - 3 - MATH 1160 Contemporary Mathematics for Elementary School Teachers II
  - 4 - PHSC 1170 Intro. to Chemistry and Earth Science for Elementary Education Majors
  - 3 - Foreign Language Requirement<sup>1</sup>
- 16

### Sophomore Year

#### First Semester

- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - EDF 3010 Principles of American Education
  - 3 - MATH 2160 Geometry for Elementary School Teachers
  - 4 - PHSC 1180 Intro. to Physics, Astronomy and Earth Science for Elementary Education Majors
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
- 16

#### Second Semester

- 3 - EDEL 3100 Arts in the Elementary School
  - 3 - EDF 3020 Educational Psychology
  - 3 - EDF 3340 Child Growth and Development
  - 3 - EDSP 3700 Introduction to Special Education
  - 3 - ENGL 3850 Children's Literature
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
- 18

**Junior Year****First Semester**

- 3 - EDEL 3210 Physical Education Methods and Content for Classroom Teachers
- 3 - EDF 3080 Classroom Assessment
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - EDLT 4600 Teaching Reading in the Elementary Grades: 2-6
- 3 - MATH 3160 Problem Solving for Math. Teachers

15**Second Semester**

- 3 - EDEL 4050 Social Justice and 21st Cen. Learners
- 3 - EDEL 4520 Elem. Methods in Math. Teaching
- 3 - EDEL 4670 Prin. and Strat. for Teaching Engl. Speakers of Other Lang. in Elem. Classrooms
- 3 - EDLT 4620 Reading and Responding to Literature in the Elementary School
- 3 - EDLT 4630 Teaching Reading and Writing to English Language Learners

15**Senior Year**

(Courses must be taken as listed in both semesters.)

**First Semester**

- 3 - EDEL 4010 Elementary Field Experience
- 3 - EDEL 4510 Elem. Methods in Science Teaching
- 3 - EDEL 4870 Elementary Methods in Social Studies Teaching
- 3 - EDEL 4880 Elementary Methods in Language Arts Teaching
- 3 - EDLT 4610 Content Area Reading: Grades 2-6

15**Second Semester**

- 3 - EDEL 4820 Capstone Sem. in Elem. Teaching
- 9 - EDEL 4830 Directed Teaching in the Elementary School

12

122 Total Semester Hours

<sup>†</sup>Two semesters (through 2020) in the same modern foreign language (including American Sign Language) are required.<sup>‡</sup>Select from ENGL 2120, 2130, 2140 or 2150<sup>§</sup>See General Education Requirements.**MATHEMATICS AND SCIENCE EMPHASIS AREA****Freshman Year****First Semester**

- 4 - BIOL 1090 Introduction to Life Science
- 2 - ED 1050 Orientation to Education
- 3 - GEOG 1030 World Regional Geography
- 3 - MATH 1150 Contemporary Mathematics for Elementary School Teachers I
- 3 - Foreign Language Requirement<sup>1</sup>

15**Second Semester**

- 3 - ENGL 1030 Accelerated Composition
- 3 - HIST 1010 History of the United States *or*  
3 - HIST 1020 History of the United States
- 3 - MATH 1160 Contemporary Mathematics for Elementary School Teachers II
- 4 - PHSC 1170 Intro. to Chemistry and Earth Science for Elementary Education Majors
- 3 - Foreign Language Requirement<sup>1</sup>

16**Sophomore Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
- 3 - EDF 3010 Principles of American Education
- 3 - MATH 2160 Geometry for Elementary School Teachers
- 4 - PHSC 1180 Intro. to Physics, Astronomy, and Earth Science for Elementary Education Majors
- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>

16**Second Semester**

- 3 - EDEL 3100 Arts in the Elementary School
- 3 - EDF 3020 Educational Psychology
- 3 - EDF 3340 Child Growth and Development
- 3 - EDSP 3700 Introduction to Special Education
- 3 - ENGL 3850 Children's Literature
- 3 - Arts and Humanities (Non-Lit) Requirement<sup>3</sup>

18**Junior Year****First Semester**

- 3 - EDEL 3210 Physical Education Methods and Content for Classroom Teachers
- 3 - EDF 3080 Classroom Assessment
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - EDLT 4600 Teaching Reading in the Elementary Grades: 2-6
- 3 - MATH 3160 Problem Solving for Math. Teachers

15**Second Semester**

- 3 - EDEL 4520 Elem. Methods in Math. Teaching
- 3 - ENSP 2010 Introduction to Environmental Science for Education Majors
- 3 - EDLT 4620 Reading and Responding to Literature in the Elementary School
- 3 - MATH 3150 Advanced Topics in Mathematics for Elementary Teachers
- 3 - Science Content Requirement<sup>4</sup>

15**Senior Year**

(Courses must be taken as listed in both semesters.)

**First Semester**

- 3 - EDEL 4010 Elementary Field Experience
- 3 - EDEL 4510 Elem. Methods in Science Teaching
- 3 - EDEL 4870 Elementary Methods in Social Studies Teaching
- 3 - EDEL 4880 Elementary Methods in Language Arts Teaching
- 3 - EDLT 4610 Content Area Reading: Grades 2-6

15**Second Semester**

- 3 - EDEL 4820 Capstone Sem. in Elem. Teaching
- 9 - EDEL 4830 Directed Teaching in the Elem. Sch.

12

122 Total Semester Hours

<sup>†</sup>Two semesters (through 2020) in the same modern foreign language (including American Sign Language) are required.<sup>‡</sup>Select from ENGL 2120, 2130, 2140 or 2150.<sup>§</sup>See General Education Requirements.<sup>¶</sup>Any ASTR, BIOL, CH, ENR, ENSP, ENT, FOR, FNR, GEN, GEOL or PHYS course chosen in conjunction with advisor.**MATHEMATICS TEACHING****Bachelor of Science**

The program leading to a Bachelor of Science degree in Mathematics Teaching is designed for students planning to teach mathematics on the secondary school level (grades 9-12). (Note: The program leading to a Bachelor of Arts degree in Secondary Education with a Teaching Area of Mathematics is also designed for students planning to teach mathematics on the secondary school level.) To be recommended for certification, students must earn a grade of C or higher in all mathematics content courses.

**Freshman Year****First Semester**

- 4 - CH 1050 Chemistry in Context I
- 2 - ED 1050 Orientation to Education
- 4 - MATH 1060 Calculus of One Variable I
- 3 - PHIL 1020 Introduction to Logic
- 3 - Cross-Cultural Awareness Requirement<sup>1</sup>

16**Second Semester**

- 3 - ENGL 1030 Accelerated Composition
- 4 - MATH 1080 Calculus of One Variable II
- 3 - PHYS 1220 Physics with Calculus I
- 1 - PHYS 1240 Physics Lab I
- 3 - Science Requirement<sup>2</sup>

14**Sophomore Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
- 3 - EDSC 2260 A Prof. Approach to Sec. Algebra
- 4 - MATH 2060 Calculus of Several Variables
- 3 - PHYS 2210 Physics with Calculus II
- 1 - PHYS 2230 Physics Lab. II
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>

17**Second Semester**

- 3 - ECON 2000 Economic Concepts *or*  
3 - ECON 2110 Principles of Microeconomics
- 3 - EDF 3020 Educational Psychology
- 4 - MATH 2080 Intro. to Ordinary Diff. Equations
- 3 - MATH 3110 Linear Algebra
- 3 - MATH 3190 Introduction to Proofs

16**Junior Year****First Semester**

- 3 - EDF 3010 Principles of American Education
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - EDSC 3260 Practicum in Secondary Math.
- 3 - MATH 3020 Statistics for Science and Engr.
- 3 - SOC 2010 Introduction to Sociology *or*  
3 - SOC 2020 Social Problems
- 3 - Science Requirement<sup>2</sup>

18**Second Semester**

- 3 - EDF 3350 Adolescent Growth and Development
- 3 - EDSC 4370 Technology in Secondary Math.
- 3 - EDSP 3700 Introduction to Special Education
- 3 - MATH 3080 College Geometry
- 3 - MATH 4120 Introduction to Modern Algebra

15

**Senior Year****First Semester**

- 3 - EDSC 4260 Teaching Secondary Mathematics<sup>4</sup>
- 3 - EDLT 4980 Secondary Content Area Reading<sup>4</sup>
- 3 - MATH 4000 Theory of Probability *or*
  - 3 - MATH 4020 Statics for Science and Eng. II
- 3 - MATH 4080 Topics in Geometry
- 3 - MATH 4530 Advanced Calculus I

15

**Second Semester**

- 9 - EDSC 4460 Teaching Internship in Sec. Math.<sup>5</sup>
- 3 - EDSC 4560 Secondary Math. Capstone Sem.<sup>5</sup>

12

123 Total Semester Hours

<sup>1</sup>See General Education Requirements.<sup>2</sup>Select from courses in ASTR, BIOL, CH, GEOL, PHYS<sup>3</sup>ENGL 1900, 2120, 2130, 2140, 2150, 2210<sup>4</sup>EDSC 4260 and EDLT 4980 must be taken concurrently prior to the teaching internship. Offered fall semester only.<sup>5</sup>EDSC 4460 and 4560 must be taken concurrently. Offered spring semester only.**SCIENCE TEACHING**

The programs leading to a Bachelor of Arts or Bachelor of Science degree in Science Teaching are designed for students planning to teach biological sciences, chemistry, earth sciences, or physical sciences on the secondary school level (grades 9–12). To be recommended for certification, students must earn a grade of C or higher in all science content courses.

**Double Majors in Science Teaching and Content Area**

The Bachelor of Arts Degree in Science Teaching will result in a double major in Science Teaching and the select content area (Biological Science, Chemistry, or Physics). To achieve the double major, the plan of study listed under Science Teaching must be followed. The double major prepares students for teaching science on the secondary level and graduate work in the respective content field.

**TEACHING AREA:  
BIOLOGICAL SCIENCES****Bachelor of Arts****Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
- 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology
- 4 - CH 1010 General Chemistry
- 2 - ED 1050 Orientation to Education
- 4 - MATH 1060 Calculus of One Variable I
- 3 - Foreign Language Requirement<sup>1</sup>

17-18

**Second Semester**

- 3 - BIOL 1040 General Biology I *and*
- 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
- 4 - CH 1020 General Chemistry
- 3 - ENGL 1030 Accelerated Composition
- 3 - Foreign Language Requirement<sup>1</sup>
- 3 - Statistics Requirement<sup>2</sup>

17-18

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry
- 1 - CH 2020 Survey of Organic Chemistry Lab.
- 3 - HIST 1220 History, Technology and Society *or*
  - 3 - HIST 1240 Environmental History Survey
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 3 - Biochemistry or Genetics Requirement<sup>4</sup>

17

**Second Semester**

- 4 - BIOL 3160 Human Physiology
- 3 - EDF 3010 Principles of American Education
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 3 - Biochemistry or Genetics Requirement<sup>4</sup>

17

**Junior Year****First Semester**

- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - EDF 3020 Educational Psychology
- 3 - EDSC 3270 Practicum in Secondary Science
- 3 - Ecology Requirement<sup>6</sup>

14

**Second Semester**

- 3 - BIOL 3350 Evolutionary Biology
- 3 - BIOL (EDSC) 4820 Laboratory Techniques for Teaching Science
- 3 - EDF 3350 Adolescent Growth and Development
- 3 - ENGL 3150 Scientific Writing and Comm.
- 4 - Animal or Plant Diversity Requirement<sup>5</sup>

16

**Senior Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
- 3 - EDSP 3700 Introduction to Special Education
- 3 - EDSC 4270 Teaching Secondary Science<sup>7</sup>
- 3 - EDLT 4980 Secondary Content Area Reading<sup>7</sup>
- 3 - ANTH 2010 Introduction to Anthropology *or*
  - 3 - GEOG 1030 World Regional Geography
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>8</sup>

18

**Second Semester**

- 9 - EDSC 4470 Teaching Internship in Sec. Sci.<sup>9</sup>
- 3 - EDSC 4570 Sec. Science Capstone Seminar<sup>9</sup>

12

128–130 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in any modern foreign language (including American Sign Language) are required.<sup>2</sup>STAT 2300 or 3090<sup>3</sup>ENGL 2120, 2130, 2140, or 2150<sup>4</sup>One lecture course must be completed for both biochemistry (BCHM 3010 or BCHM 3050) and for genetics (GEN 3000 or GEN 3020).<sup>5</sup>One lecture and associated laboratory must be completed for animal diversity (BIOL 3020/3060 or BIOL 3030/3070) or for plant diversity (BIOL 3040/3080, BIOL 3200, or BIOL 4060/4070).<sup>6</sup>BIOL 4410, 4430, 4460, or 4700<sup>7</sup>To be taken the semester prior to EDSC 4470 and 4570. EDSC 4270 and EDLT 4980 must be taken concurrently.<sup>8</sup>See General Education Requirements.<sup>9</sup>EDSC 4470 and 4570 must be taken concurrently. Offered spring semester only.**TEACHING AREA:  
BIOLOGICAL SCIENCES****Bachelor of Science****Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
- 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology I
- 4 - CH 1010 General Chemistry
- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
- 4 - MATH 1060 Calculus of One Variable I

15-16

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
- 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
- 4 - CH 1020 General Chemistry
- 2 - ED 1050 Orientation to Education
- 3 - ENGL 1030 Accelerated Composition
- 3 - Statistics Requirement<sup>1</sup>

16-17

**Sophomore Year****First Semester**

- 3 - CH 2010 Survey of Organic Chemistry
- 1 - CH 2020 Survey of Organic Chemistry Lab.
- 3 - EDF 3020 Educational Psychology
- 3 - HIST 1220 History, Technology, and Society *or*
  - 3 - HIST 1240 Environmental History Survey
- 3 - PHYS 2070 General Physics I
- 1 - PHYS 2090 General Physics I Lab.
- 3 - Biochemistry or Genetics Requirement<sup>2</sup>

17

**Second Semester**

- 4 - BIOL 3160 Human Physiology
- 3 - EDF 3010 Principles of American Education
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - PHYS 2080 General Physics II
- 1 - PHYS 2100 General Physics II Lab.
- 3 - Biochemistry or Genetics Requirement<sup>2</sup>

17

**Junior Year****First Semester**

- 3 - BIOL 4610 Cell Biology
- 2 - BIOL 4620 Cell Biology Laboratory
- 3 - EDSC 3270 Practicum in Secondary Science
- 3 - Ecology Requirement<sup>3</sup>
- 4 - Plant or Animal Diversity Requirement<sup>4</sup>

15

**Second Semester**

- 3 - BIOL 3350 Evolutionary Biology
- 3 - BIOL (EDSC) 4820 Laboratory Techniques for Teaching Science
- 3 - EDF 3350 Adolescent Growth and Development
- 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>

12

**Senior Year****First Semester**

- 3 - EDSP 3700 Introduction to Special Education
  - 3 - EDSC 4270 Teaching Secondary Science<sup>6</sup>
  - 3 - EDLT 4980 Secondary Content Area Reading<sup>6</sup>
  - 3 - ANTH 2010 Introduction to Anthropology *or*
  - 3 - GEOG 1030 World Regional Geography
  - 3 - Art and Humanities (Non-Lit.) Requirement<sup>5</sup>
- 15

**Second Semester**

- 9 - EDSC 4470 Teaching Internship in Sec. Sci.<sup>7</sup>
  - 3 - EDSC 4570 Sec. Science Capstone Seminar<sup>7</sup>
- 12

120-121 Total Semester Hours<sup>8</sup><sup>1</sup>STAT 2300 or 3090<sup>2</sup>One lecture course must be completed for both biochemistry (BCHM 3010 or 3050) and for genetics (GEN 3000 or 3020).<sup>3</sup>BIOL 4410, 4430, 4460, or 4700<sup>4</sup>One lecture and associated laboratory must be completed for animal diversity (BIOL 3020/3060 or 3030/3070) or for plant diversity (BIOL 3040/3080).<sup>5</sup>See General Education Requirements.<sup>6</sup>To be taken the semester prior to EDSC 4470 and 4570. EDSC 4270 and EDLT 4980 must be taken concurrently. Offered fall semester only.<sup>7</sup>EDSC 4470 and 4570 must be taken concurrently. Offered spring semester only.<sup>8</sup>One hour of elective credit may be needed to achieve the minimum 120 hours.**TEACHING AREA: CHEMISTRY****Bachelor of Arts****Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 1 - CH 1410 Chemistry Orientation
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - Foreign Language Requirement<sup>1</sup>
- 15

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 2 - CH 1520 Chemistry Communication I
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Laboratory I
  - 3 - Foreign Language Requirement<sup>1</sup>
- 17

**Sophomore Year****First Semester**

- 3 - CH 2230 Organic Chemistry
  - 1 - CH 2270 Organic Chemistry Laboratory
  - 2 - ED 1050 Orientation to Education
  - 3 - HIST 1220 History, Technology and Society *or*
  - 3 - HIST 1240 Environmental History Survey
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Laboratory II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
- 16

**Second Semester**

- 3 - CH 2050 Intro. to Inorganic Chemistry
  - 3 - CH 2240 Organic Chemistry
  - 1 - CH 2280 Organic Chemistry Laboratory
  - 3 - EDF 3010 Principles of American Education
  - 3 - EDF 4800 Foundations of Digital Media and Learning
  - 3 - PHYS 2220 Physics with Calculus III
- 16

**Junior Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Laboratory I *or*
  - 5 - BIOL 1100 Principles of Biology I
  - 3 - CH 3130 Quantitative Analysis
  - 1 - CH 3170 Quantitative Analysis Laboratory
  - 3 - CH 3300 Introduction to Physical Chemistry
  - 3 - EDSC 3270 Practicum in Secondary Science
- 14-15

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Laboratory II *or*
  - 5 - BIOL 1110 Principles of Biology II
  - 3 - BIOL (EDSC) 4820 Laboratory Techniques for Teaching Science
  - 3 - EDF 3020 Educational Psychology
  - 3 - EDF 3350 Adolescent Growth and Development
  - 3 - Statistics Requirement<sup>3</sup>
- 16-17

**Senior Year****First Semester**

- 3 - EDSP 3700 Introduction to Special Education
  - 3 - EDSC 4270 Teaching Secondary Science<sup>4</sup>
  - 3 - EDLT 4980 Secondary Content Area Reading<sup>4</sup>
  - 3 - GEOG 1030 World Regional Geography
  - 3 - Arts and Humanities (Literature) Requirement<sup>5</sup>
- 15

**Second Semester**

- 3 - CH 4500 Chemistry Capstone
  - 1 - CH 4520 Chemistry Communication II
  - 9 - EDSC 4470 Teaching Internship in Sec. Sci.<sup>6</sup>
  - 3 - EDSC 4570 Sec. Science Capstone Seminar<sup>6</sup>
- 16

125-127 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in any modern foreign language or American Sign Language are required.<sup>2</sup>See General Education Requirements.<sup>3</sup>MATH 3020, STAT 2300, 3090, or 3300<sup>4</sup>To be taken the semester prior to EDSC 4470 and 4570. EDSC 4270 and EDLT 4980 must be taken concurrently. Offered fall semester only.<sup>5</sup>ENGL 2120, 2130, 2140, or 2150<sup>6</sup>EDSC 4470 and 4570 must be taken concurrently. Offered spring semester only.**TEACHING AREA:****PHYSICAL SCIENCES****Bachelor of Science****Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 3 - COMM 1500 Introduction Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 2 - ED 1050 Orientation to Education
  - 3 - HIST 1220 History, Technology, and Society *or*
  - 3 - HIST 1240 Environmental History Survey
  - 4 - MATH 1060 Calculus of One Variable I
- 16

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Lab. I
- 15

**Sophomore Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology I
  - 3 - CH 2010 Survey of Organic Chemistry
  - 1 - CH 2020 Survey of Organic Chemistry Lab.
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Lab. II
- 16-17

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
  - 3 - CH 2050 Intro. to Inorganic Chemistry
  - 3 - EDF 3010 Principles of American Education
  - 3 - EDF 4800 Foundations of Digital Media and Learning
  - 3 - PHYS 2220 Physics with Calculus III
  - 1 - PHYS 2240 Physics Lab. III
- 17-18

**Junior Year****First Semester**

- 3 - ASTR 1050 Physics of the Universe *or*
  - 3 - ASTR 1020 Stellar Astronomy *and*
  - 1 - ASTR 1040 Stellar Astronomy Lab.
  - 3 - CH 3130 Quantitative Analysis
  - 1 - CH 3170 Quantitative Analysis Lab.
  - 3 - CH 3300 Introduction to Physical Chemistry
  - 3 - EDSC 3270 Practicum in Secondary Science
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 16-17

**Second Semester**

- 3 - BIOL (EDSC) 4820 Laboratory Techniques for Teaching Science
  - 3 - EDF 3020 Educational Psychology
  - 3 - EDF 3350 Adolescent Growth and Development
  - 3 - Social Science Requirement<sup>2</sup>
  - 3 - Statistics Requirement<sup>2</sup>
- 15

**Senior Year****First Semester**

- 3 - EDSP 3700 Introduction to Special Education
  - 3 - EDLT 4980 Secondary Content Area Reading<sup>4</sup>
  - 3 - EDSC 4270 Teaching Secondary Science<sup>4</sup>
  - 3 - PHIL 3240 Philosophy of Technology *or*
  - 3 - PHIL 3250 Philosophy of Science *or*
  - 3 - PHIL 3260 Science and Values
  - 3 - PHYS 3110 Intro. to Meth. of Theoretical Phys.
- 15

**Second Semester**

- 9 - EDSC 4470 Teaching Internship in Sec. Sci.<sup>5</sup>
  - 3 - EDSC 4570 Sec. Science Capstone Seminar<sup>5</sup>
- 12

122-125 Total Semester Hours

<sup>1</sup>ENGL 2120, 2130, 2140, or 2150<sup>2</sup>ANTH 2010, GEOG 1030, POSC 1020, or 1040<sup>3</sup>STAT 2300 or 3090<sup>4</sup>To be taken the semester prior to EDSC 4470 and 4570. EDF 4250, EDSC 4270 and EDLT 4980 must be taken concurrently. Offered fall semester only.<sup>5</sup>EDSC 4470 and 4570 must be taken concurrently. Offered spring semester only.**TEACHING AREA: PHYSICS****Bachelor of Arts****Freshman Year****First Semester**

- 4 - CH 1010 General Chemistry
  - 2 - ED 1050 Orientation to Education
  - 3 - ENGL 1030 Accelerated Composition
  - 4 - MATH 1060 Calculus of One Variable I
  - 3 - PHYS 1220 Physics with Calculus I
  - 1 - PHYS 1240 Physics Laboratory I
- 17

**Second Semester**

- 4 - CH 1020 General Chemistry
  - 4 - MATH 1080 Calculus of One Variable II
  - 3 - PHYS 2210 Physics with Calculus II
  - 1 - PHYS 2230 Physics Laboratory II
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 18

**Sophomore Year****First Semester**

- 5 - BIOL 1100 Principles of Biology I *or*
  - 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology I Lab.
  - 4 - MATH 2060 Calculus of Several Variables
  - 3 - PHYS 2220 Physics with Calculus III
  - 3 - PHYS 3250 Experimental Physics I
- 14-15

**Second Semester**

- 5 - BIOL 1110 Principles of Biology II *or*
  - 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology II Lab.
  - 3 - EDF 3010 Principles of American Education
  - 3 - EDF 4800 Foundations of Digital Media and Learning
  - 4 - MATH 2080 Intro. to Ordinary Diff. Equations
  - 3 - Social Science Requirement<sup>1</sup>
- 17-18

**Junior Year****First Semester**

- 3 - ASTR 101 Solar System Astronomy
  - 3 - CH 3300 Intro. to Physical Chemistry *or*
  - 3 - CH 3310 Physical Chemistry
  - 3 - EDSC 3270 Practicum in Secondary Science
  - 3 - PHYS 3210 Mechanics I
  - 3 - Foreign Language Requirement<sup>2</sup>
- 15

**Second Semester**

- 3 - BIOL (EDSC) 4820 Laboratory Techniques for Teaching Science
  - 3 - EDF 3020 Educational Psychology
  - 3 - EDF 3350 Adolescent Growth and Develop.
  - 3 - MATH 4340 Advanced Engineering Math. *or*
  - 3 - PHYS 3110 Intro. to the Methods of Theoretical Physics
  - 3 - Foreign Language Requirement<sup>2</sup>
  - 3 - Social Science Requirement<sup>1</sup>
- 18

**Senior Year****First Semester**

- 3 - EDSC 4270 Teaching Secondary Science<sup>3</sup>
  - 3 - EDLT 4980 Secondary Content Area Reading<sup>3</sup>
  - 3 - PHYS 4410 Electromagnetics I
  - 3 - PHYS 4550 Quantum Physics I
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 15

**Second Semester**

- 3 - EDSP 3700 Introduction to Special Education
  - 9 - EDSC 4470 Teaching Internship in Secondary Science<sup>4</sup>
  - 3 - EDSC 4570 Sec. Science Capstone Seminar<sup>4</sup>
- 15
- 129-131 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society General Education Requirements.<sup>2</sup>Two semesters (through 2020) in any modern foreign language or American Sign Language.<sup>3</sup>To be taken the semester prior to EDSC 4470 and 4570. EDSC 4270 and EDLT 4980 must be taken concurrently.<sup>4</sup>EDSC 4470 and 4570 must be taken concurrently. Offered during spring semester only.**SECONDARY EDUCATION**

The Bachelor of Arts degree in Secondary Education is available to students preparing to teach English and mathematics on the secondary school level (grades 9-12). The teaching field should be selected as early as possible so appropriate freshman and sophomore courses may be taken.

Each curriculum is a double major composed of the major concentration in the teaching field and the corresponding content major. Specific courses and sequences have been designated to meet requirements for those planning to teach. The professional education courses should be completed in sequence.

**TEACHING AREA: ENGLISH**

The Bachelor of Arts Degree in Secondary Education—English offers a double major in Secondary Education—English and English.

**Freshman Year****First Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 2 - ED 1050 Orientation to Education
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 3 - Mathematics Requirement<sup>2</sup>
- 14

**Second Semester**

- 3 - BIOL 2000 Biology in the News<sup>3</sup>
  - 3 - ENGL 2120 World Literature
  - 3 - HIST 1730 The West and the World II
  - 3 - Foreign Language Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>2</sup>
- 16

**Sophomore Year****First Semester**

- 3 - EDF 3010 Principles of American Education
  - 3 - EDF 3020 Educational Psychology
  - 3 - ENGL 3100 Critical Writing About Literature
  - 3 - HIST 3160 American Social History *or*
  - 3 - HIST 3610 History of England to 1688 *or*
  - 3 - HIST 3630 Britain Since 1688 *or*
  - 3 - HIST 3650 British Cultural History
  - 3 - Arts and Humanities (Non-Lit) Req.<sup>4</sup>
  - 3 - English Literature Survey Requirement<sup>5</sup>
- 18

**Second Semester**

- 3 - EDF 3350 Adolescent Growth and Development
  - 3 - ENGL 3860 Adolescent Literature<sup>6</sup>
  - 3 - ENGL 4110 Shakespeare
  - 3 - English Literature Survey Requirement<sup>5</sup>
  - 3 - Fine Arts Requirement<sup>7</sup>
- 15

**Junior Year****First Semester**

- 3 - EDF 4800 Foundations of Digital Media and Learning
  - 3 - EDSC 3240 Prac. in Teaching Secondary Engl.<sup>8</sup>
  - 3 - EDSP 3700 Introduction to Special Education
  - 3 - English Literature Survey Requirement<sup>5</sup>
  - 3 - Literature Emphasis Area Requirement<sup>9</sup>
- 15

**Second Semester**

- 3 - English Literature Requirement<sup>10</sup>
  - 3 - Literary Theory Requirement<sup>11</sup>
  - 3 - Literature Emphasis Area Requirement II<sup>12</sup>
  - 3 - Literature Emphasis Area Requirement III<sup>13</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 15

**Senior Year****First Semester**

- 3 - EDLT 4980 Secondary Content Area Reading<sup>14</sup>
  - 3 - EDSC 4240 Teaching Secondary English<sup>14</sup>
  - 3 - ENGL 4850 Composition for Teachers<sup>14</sup>
  - 3 - ENGL 4960 English Senior Seminar
  - 3 - Literature Emphasis Area Diversity Req.<sup>15</sup>
- 15

**Second Semester**

9 - EDSC 4440 Teaching Intern. in Secondary English<sup>16</sup>

3 - EDSC 4540 Secondary English Capstone Sem.<sup>16</sup>  
12

120 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language are required.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>Any other course related to science or mathematics that satisfies the General Education Science and Technology in Society requirement may be substituted.

<sup>4</sup>Select from PHIL 1010, 1020, or 1030.

<sup>5</sup>Select from ENGL 3960, 3970, 3980, or 3990. One course each of British and American Survey are required. The additional course satisfies the upper level ENGL requirement.

<sup>6</sup>This course qualifies as a Literature Emphasis Area Requirement for a BA in English.

<sup>7</sup>Select from AAH 1010 or 2100; ENGL 3570; HUM 3010, 3020, or 3060; MUSC 2100, 3110, 4150, or 4160; or THEA 2100.

<sup>8</sup>Students must complete 45 hours of field experience in a public school.

<sup>9</sup>Select from ENGL 4030, 4070, 4080, 4100, 4140, 4200, (THEA) 4290, 4440, or 4630.

<sup>10</sup>Select any 4000 level ENGL course.

<sup>11</sup>Select from ENGL 4350, 4360, 4400, or 4420, or other course approved by the department.

<sup>12</sup>Select from ENGL 4150, 4160, 4170, 4180, 4210, 4250, 4260, or 4640.

<sup>13</sup>Select from ENGL 4280, (THEA) 4300, 4310, 4320, 4330, 4340, 4550, or 4650.

<sup>14</sup>EDLT 4980, EDSC 4240, and ENGL (EDSC) 4850 must be taken concurrently during fall semester of senior year. Students must also enroll in the laboratory sections of EDSC 4240 and EDLT 4980.

<sup>15</sup>Select from ENGL 3530, 3800, 4190, (HUM) 4560, 4820, or 4830.

<sup>16</sup>EDSC 4440 and EDSC 4540 must be taken concurrently during spring semester of senior year.

## TEACHING AREA: MATHEMATICS

The Bachelor of Arts degree in Secondary Education—Mathematics offers a double major in Secondary Education—Mathematics and Mathematical Sciences. To be recommended for certification, students must earn a C or higher in all mathematics content courses.

### Bachelor of Arts

#### Freshman Year

##### First Semester

2 - ED 1050 Orientation to Education  
3 - ENGL 1030 Accelerated Composition  
4 - MATH 1060 Calculus of One Variable I  
3 - Foreign Language Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>2</sup>  
16

##### Second Semester

3 - HIST 1020 History of the United States  
4 - MATH 1080 Calculus of One Variable II  
3 - PHIL 1020 Introduction to Logic  
3 - PHYS 1220 Physics with Calculus I  
1 - PHYS 1240 Physics Laboratory I  
3 - Foreign Language Requirement<sup>1</sup>  
17

### Sophomore Year

#### First Semester

3 - ECON 2000 Economic Concepts *or*  
3 - ECON 2110 Principles of Microeconomics  
3 - EDSC 2260 A Prof. Approach to Sec. Algebra  
4 - MATH 2060 Calculus of Several Variables  
1 - MATH 2500 Intro. to Mathematical Sciences  
3 - Arts and Humanities (Literature) Requirement<sup>3</sup>  
3 - Computer Science Requirement<sup>4</sup>  
17

#### Second Semester

3 - EDF 3020 Educational Psychology  
4 - MATH 2080 Intro. to Ordinary Diff. Equations  
3 - MATH 3110 Linear Algebra  
3 - MATH 3190 Introduction to Proof  
3 - Cross-Cultural Awareness Requirement<sup>2</sup>  
18

### Junior Year

#### First Semester

3 - EDF 3010 Principles of American Education  
3 - EDF 4800 Foundations of Digital Media and Learning  
3 - EDSC 3260 Practicum in Secondary Math.  
3 - MATH 3020 Statistics for Science and Engr.  
3 - MATH 4000 Theory of Probability  
15

#### Second Semester

3 - EDF 3350 Adolescent Growth and Development  
3 - EDSP 3700 Introduction to Special Education  
3 - EDSC 4370 Technology in Secondary Math.  
3 - MATH 3080 College Geometry  
3 - MATH 4120 Introduction to Modern Algebra  
15

### Senior Year

#### First Semester

3 - COMM 2500 Public Speaking  
3 - EDLT 4980 Secondary Content Area Reading<sup>5</sup>  
3 - EDSC 4260 Teaching Secondary Mathematics<sup>7</sup>  
3 - MATH 4080 Topics in Geometry  
3 - MATH 4530 Advanced Calculus I  
15

#### Second Semester

9 - EDSC 4460 Teaching Internship in Secondary Mathematics<sup>6</sup>  
3 - EDSC 4560 Secondary Math. Capstone Sem.<sup>6</sup>  
12

123 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in any modern foreign language (including American Sign Language) are required.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>ENGL 2120, 2130, 2140, or 2150

<sup>4</sup>CPS 1010, 1110, 1150, 1610, or 2200

<sup>5</sup>EDSC 4260 and EDLT 4980 must be taken concurrently prior to the teaching internship. Offered fall semester only.

<sup>6</sup>EDSC 4460 and 4560 must be taken concurrently. Offered spring semester only.

## TEACHING AREA: SOCIAL STUDIES (HISTORY)

The Bachelor of Arts Degree in Secondary Education—Social Studies (History) offers a double major in Secondary Education—Social Studies (History) and History.

### Freshman Year

#### First Semester

2 - ED 1050 Orientation to Education  
3 - ENGL 1030 Accelerated Composition  
3 - MATH 1010 Essential Math. for Informed Soc.  
3 - Foreign Language Requirement<sup>1</sup>  
4 - Natural Science Requirement<sup>2</sup>  
15

#### Second Semester

3 - ANTH 2010 Introduction to Anthropology  
3 - BIOL 2000 Biology in the News<sup>3</sup>  
3 - ENGL 2140 American Literature  
3 - GEOG 1010 Introduction to Geography  
3 - PSYC 2010 Introduction to Psychology  
3 - Foreign Language Requirement<sup>1</sup>  
18

### Sophomore Year

#### First Semester

3 - ECON 2000 Economic Concepts  
3 - EDF 3020 Educational Psychology  
3 - HIST 1010 History of the United States  
3 - HIST 1720 The West and the World I  
3 - POSC 1010 American National Government  
15

#### Second Semester

3 - HIST 1020 History of the United States  
3 - HIST 1730 The West and the World II  
4 - HIST 2990 Seminar: The Historian's Craft  
3 - Advanced Humanities Requirement<sup>4</sup>  
3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>  
16

### Junior Year

#### First Semester

3 - EDF (HIST) 3200 History of U.S. Public Educ.  
3 - EDF 3350 Adolescent Growth and Development  
3 - EDSC 3280 Practicum in Secondary Social Studies  
9 - Teaching Major<sup>5</sup>  
18

#### Second Semester

3 - SOC 2010 Introduction to Sociology  
3 - Advanced Humanities Requirement<sup>4</sup>  
3 - Arts and Humanities (Literature) Requirement<sup>2</sup>  
9 - Teaching Major<sup>5</sup>  
18

### Senior Year

#### First Semester

3 - EDF 4800 Foundations of Digital Media and Learning  
3 - EDSP 3700 Introduction to Special Education  
3 - EDSC 4280 Teaching Secondary Social Studies<sup>6</sup>  
3 - EDLT 4980 Secondary Content Area Reading<sup>6</sup>  
3 - HIST 4900 Senior Seminar<sup>6</sup>  
3 - Advanced Humanities Requirement<sup>4</sup>  
18

#### Second Semester

9 - EDSC 4480 Teaching Internship in Secondary Social Studies<sup>7</sup>  
3 - EDSC 4580 Secondary Social Studies Capstone Seminar<sup>7</sup>  
12

130 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in any modern foreign language, including American Sign Language, are required.

<sup>2</sup>See General Education Requirements.

<sup>3</sup>Any other course related to science or mathematics that satisfies the General Education and Science and Technology in Society requirement may be substituted.

<sup>4</sup>Select from AAH 2100, MUSC 2100, THEA 2100, or any AAH, COMM (except 3640, 3680), ENGL (except 3040, 3120, 3140, 3160, 3330, 4850, 4900, 4950), HUM, MUSC, PHIL, REL, THEA (except 3770, 4870, 4970), WS, or foreign language course numbered 3000 or higher.

<sup>5</sup>See advisor. Students must complete a minimum of three hours each of United States history and European history, and six hours of non-Western history selected from 3000- or 4000-level HIST courses. At least one course must be at the 4000 level.

<sup>6</sup>EDSC 4280, HIST 4900, and EDLT 4980 must be taken concurrently in the fall semester of the senior year.

<sup>7</sup>EDSC 4480 and 4580 must be taken concurrently. Offered spring semester only.

## SPECIAL EDUCATION

### Bachelor of Arts

The Bachelor of Arts degree in Special Education prepares students to teach individuals with mild disabilities in grades P-12. The curriculum is designed to meet the competencies outlined by the Council for Exceptional Children for beginning special education teachers. Students completing the program receive instruction and practical experiences that lead to Multi-Categorical Special Education Certification in South Carolina.

### Freshman Year

#### First Semester

- 2 - ED 1050 Orientation to Education
- 3 - HIST 1240 Environmental History Survey *or*  
3 - HIST 1220 History, Technology, and Society
- 3 - MATH 1150 Contemporary Mathematics for Elementary School Teachers I
- 3 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>2</sup>

15

#### Second Semester

- 3 - ENGL 1030 Accelerated Composition
- 3 - GEOG 1030 World Regional Geography
- 3 - MATH 1160 Contemporary Mathematics for Elementary School Teachers II
- 3 - Foreign Language Requirement<sup>1</sup>
- 4 - Natural Science Requirement<sup>2</sup>

16

### Sophomore Year

#### First Semester

- 3 - EDF 3010 Principles of American Education
- 3 - EDSP 3700 Introduction to Special Education
- 3 - MATH 2160 Geometry for Elementary School Teachers
- 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 4 - Natural Science Requirement<sup>2</sup>

16

#### Second Semester

- 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
- 3 - EDF 3020 Educational Psychology
- 3 - EDF 3340 Child Growth and Development *or*  
3 - EDF 3350 Adolescent Growth and Dev.
- 3 - Arts and Humanities (Non-Lit.) Requirement<sup>4</sup>
- 3 - History Requirement<sup>5</sup>

15

## Junior Year

### First Semester

- 3 - EDEL 3100 Arts in the Elementary School
- 3 - EDLT 4600 Teaching Reading in the Elementary Grades: 2-6<sup>6</sup>
- 3 - EDF 4800 Foundations of Digital Media and Learning
- 3 - EDSP 3720 Char. and Instruction of Individuals with Learning Disabilities<sup>6</sup>
- 3 - EDSP 3740 Char. and Strat. for Individuals with Emotional/Behavioral Disorders<sup>6</sup>

15

### Second Semester

- 3 - EDEL 4510 Elem. Meth. in Science Teaching<sup>7</sup>
- 3 - EDEL 4870 Elementary Methods in Social Studies Teaching<sup>7</sup>
- 3 - EDSP 3730 Characteristics and Instruction of Individuals with Intellectual Disabilities and Autism<sup>7</sup>
- 3 - EDSP 3750 Early Intervention Strategies for Young Children with Special Needs<sup>7</sup>
- 3 - EDSP 4910 Educational Assessment of Individuals with Disabilities<sup>7</sup>

15

## Senior Year

### First Semester

- 3 - EDSP 4920 Mathematics Instruction for Individuals with Mild Disabilities<sup>8</sup>
- 3 - EDSP 4930 Classroom and Behavior Management for Special Educators<sup>8</sup>
- 3 - EDSP 4940 Teaching Reading to Students with Mild Disabilities<sup>8</sup>
- 3 - EDSP 4960 Special Education Field Experience<sup>8</sup>
- 3 - EDSP 4970 Secondary Methods for Individuals with Disabilities<sup>8</sup>

15

### Second Semester

- 3 - EDSP 4950 Communication and Collaboration in Special Education<sup>9</sup>
- 12 - EDSP 4980 Directed Teaching in Special Ed.<sup>9</sup>

15

122 Total Semester Hours

<sup>1</sup>Two semesters (through 2020) in the same modern foreign language (including American Sign Language) are required.

<sup>2</sup>See General Education Requirements. Eight credit hours must be in a sequence. Biological and physical sciences must be represented. PHSC 1070, 1080, and BIOL 1090 are recommended.

<sup>3</sup>ENGL 2120, 2130, 2140, or 2150.

<sup>4</sup>See General Education Requirements.

<sup>5</sup>HIST 1010, 1020, 1720, 1730, or 1930.

<sup>6</sup>EDLT 4600 and EDSP 3720 and 3740 must be taken concurrently during the fall semester of junior year.

<sup>7</sup>EDEL 4510 and 4870, EDSP 3730, 3750, and 4910, and must be taken concurrently during the spring semester of the junior year.

<sup>8</sup>EDSP 4920, 4930, 4940, 4960, and 4970 must be taken concurrently during the fall semester of the senior year.

<sup>9</sup>EDSP 4950 and 4980 must be taken concurrently during the spring semester of the senior year.

## HEALTH SCIENCE

### Bachelor of Science

The Department of Public Health Sciences prepares students for careers in the health field, one of the largest industries in the United States. It includes hospitals and other medical service providers, public health organizations, health insurance companies, health/medical related sales, health fitness organizations, and community and nonprofit health agencies.

Plans of study can be arranged in health promotion and education, health services administration, leadership for cardiovascular technology, and preprofessional health studies. Students in the Health Promotion and Education Concentration have the skills to assess, plan, communicate, implement, manage, and evaluate public health promotion programs. Students in the Preprofessional Health Studies Concentration obtain the coursework and experience necessary for acceptance into various graduate programs in clinical health professions. The Cardiovascular Imaging Leadership Concentration provides a core of health science classes, training in diagnostic cardiovascular sonography, and a leadership certificate. The Health Services Administration Concentration allows students to develop skills and competencies in health administration/management for entry-level careers or graduate study in this area. A minor in Business Administration is integral to the concentration. The department, in cooperation with the College of Architecture, Arts and Humanities, also offers a joint Bachelor of Science degree in Language and International Health (see pages 68-69).

When space is available, students with fewer than 50 credit hours earned may apply to change majors into Health Science with a minimum cumulative grade-point average of 2.25. Students with 50 or more credit hours may apply for a change-of-major into Health Science when space is available based on the following restrictions:

- completion of the Health Science Mathematics and Statistics Requirements and the General Education Natural Science Requirement
- minimum cumulative grade-point average of 2.5
- submission of a 1-3-page document detailing why the applicant desires to major in Health Science and how this major would support his/her career goals

Additional information is available at [www.hehd.clemson.edu/PublicHealth/index.htm](http://www.hehd.clemson.edu/PublicHealth/index.htm).

## HEALTH PROMOTION AND EDUCATION CONCENTRATION

### Freshman Year

#### First Semester

- 3 - BIOL 1030 General Biology I *and*
- 1 - BIOL 1050 General Biology Lab. I *or*  
5 - BIOL 1100 Principles of Biology I
- 3 - HLTH 2020 Introduction to Public Health
- 3 - PSYC 2010 Introduction to Psychology
- 3 - SOC 2010 Introduction to Sociology

1 - Elective

14-15



**Second Semester**

- 3 - ENGL 1030 Accelerated Composition
  - 3 - HLTH 2030 Overview of Health Care Systems
  - 3-4 - Mathematics Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 4 - Elective
- 
- 16-17

**Sophomore Year****First Semester**

- 4 - CH 1010 General Chemistry *or*
  - 4 - CH 1050 Chemistry in Context I
  - 3 - HLTH 2980 Human Health and Disease
  - 3 - NUTR 2030 Principles of Human Nutrition
  - 3 - Guided Requirement<sup>3</sup>
  - 3 - Statistics Requirement<sup>4</sup>
- 
- 16

**Second Semester**

- 4 - CH 1020 General Chemistry *or*
  - 4 - CH 1060 Chemistry in Context II
  - 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - HLTH 2400 Determinants of Health Behavior
  - 1 - HLTH 3980 Health Appraisal Skills
  - 3 - PSYC 3400 Lifespan Developmental Psych.
- 
- 14

**Junior Year****First Semester**

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 3 - HLTH 3030 Public Health Communication
  - 3 - HLTH 3400 Hlth. Promotion Program Planning
  - 3 - HLTH 3800 Epidemiology
  - 3 - Guided Requirement<sup>3</sup>
- 
- 16

**Second Semester**

- 4 - BIOL 2230 Human Anatomy and Phys. II
  - 1 - HLTH 4190 Health Science Internship Preparation Seminar
  - 3 - HLTH 4800 Community Health Promotion
  - 3 - HLTH 4900 Research and Evaluation Strategies for Public Health
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 1 - Elective
- 
- 15

**Senior Year****First Semester**

- 5 - HLTH 4200 Health Science Internship<sup>6</sup>
  - 6 - Health Requirement<sup>5</sup>
  - 3 - Elective
- 
- 14

**Second Semester**

- 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 6 - Guided Requirement<sup>3</sup>
  - 3 - Health Requirement<sup>5</sup>
  - 3 - Elective
- 
- 15

120-122 Total Semester Hours

<sup>1</sup>MATH 1010, 1020, or 1060<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.<sup>3</sup>See advisor.<sup>4</sup>STAT 2300, 3090, or 3300<sup>5</sup>Any HLTH course not otherwise required<sup>6</sup>Internship may be done fall, spring, or summer after completing HLTH 4190. A grade-point average of 2.0 is required for registration.**Notes:**

1. A minimum grade-point average of 2.0 is required for registration in each HLTH course.
2. Students who wish to pursue preprofessional options should take CH 1010 and 1020.

**HEALTH SERVICES ADMINISTRATION CONCENTRATION****Freshman Year****First Semester**

- 3 - ECON 2110 Principles of Microeconomics
  - 3 - HLTH 2020 Introduction to Public Health
  - 4 - Natural Science Requirement<sup>1</sup>
  - 3 - Social Science Requirement<sup>2</sup>
  - 2 - Elective
- 
- 15

**Second Semester**

- 3 - ECON 2120 Principles of Macroeconomics
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - HLTH 2030 Overview of Health Care Systems
  - 3 - Guided Requirement<sup>3</sup>
  - 3-4 - Mathematics Requirement<sup>4</sup>
- 
- 15-16

**Sophomore Year****First Semester**

- 3 - ACCT 2010 Financial Accounting Concepts
  - 3 - HLTH 2980 Human Health and Disease
  - 3 - Guided Requirement<sup>3</sup> *or*
  - 3 - Elective<sup>3</sup>
  - 3 - Health Requirement<sup>5</sup>
  - 3 - Statistics Requirement<sup>6</sup>
- 
- 15

**Second Semester**

- 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - HLTH 2400 Determinants of Health Behavior
  - 3 - MGT 2010 Principles of Management
  - 3 - Guided Requirement<sup>3</sup>
  - 3 - Social Science Requirement<sup>2</sup>
- 
- 15

**Junior Year****First Semester**

- 3 - APEC (HLTH) 3610 Introduction to Health Care Economics
  - 3 - HLTH 3800 Epidemiology
  - 3 - LAW 3220 Legal Environment of Business
  - 3 - MKT 3010 Principles of Marketing
  - 3 - Guided Requirement<sup>3</sup> *or*
  - 3 - Elective<sup>3</sup>
- 
- 15

**Second Semester**

- 1 - HLTH 4190 Health Science Internship Preparation Seminar
  - 3 - HLTH 4900 Research and Evaluation Strategies for Public Health
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 3 - Guided Requirement<sup>3</sup>
  - 3 - Health Requirement<sup>5</sup>
  - 3 - Elective
- 
- 16

**Senior Year****First Semester**

- 3 - FIN 3060 Corporation Finance
  - 5 - HLTH 4200 Health Science Internship<sup>7</sup>
  - 3 - HLTH 4400 Managing Health Service Org.
  - 3 - HLTH 4750 Principles of Health Care Operations Management and Research
- 
- 14

**Second Semester**

- 3 - HLTH 4600 Health Information Systems
  - 3 - HLTH 4780 Health Policy Ethics and Law
  - 3 - HLTH 4790 Financial Management and Budgeting for Health Service Organizations
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 3 - Guided Requirement<sup>3</sup>
- 
- 15

120-121 Total Semester Hours

<sup>1</sup>BIOL 1030/1050, 1100, CH 1010, 1050, PHYS 1220/1240, or 2070/2090<sup>2</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.<sup>3</sup>See advisor. Courses in Spanish are strongly recommended.<sup>4</sup>MATH 1010, 1020, or 1060<sup>5</sup>Any HLTH course not otherwise required<sup>6</sup>STAT 2300 or 3090<sup>7</sup>Internship may be done fall, spring, or summer after completing HLTH 4190.*Note:* A minimum grade-point average of 2.0 is required for registration in each HLTH course.**CARDIOVASCULAR IMAGING LEADERSHIP CONCENTRATION****Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Lab. I *or*
  - 5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - HLTH 2020 Introduction to Public Health
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 14-15

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Lab. II *or*
  - 5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - HLTH 2030 Overview of Health Care Systems
  - 3-4 - Mathematics Requirement<sup>2</sup>
- 
- 17-19

**Sophomore Year****First Semester**

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 3 - CVT 2260 Intro. to Cardiovascular Sonography
  - 3 - HLTH 2980 Human Health and Disease
  - 3 - PHYS 2070 General Physics I
  - 1 - PHYS 2090 General Physics I Laboratory
  - 3 - Statistics Requirement<sup>3</sup>
- 
- 17

**Second Semester**

- 4 - BIOL 2230 Human Anatomy and Physiology II
  - 3 - COMM 1500 Introduction to Human Comm. *or*  
3 - COMM 2500 Public Speaking
  - 3 - CVT 2250 Ultrasound Physics
  - 3 - HEHD 4000 Intro. to Leadership Theories and Concepts
  - 3 - HLTH 2400 Determinants of Health Behavior
- 
- 16

**Junior Year****First Semester**

- 4 - CVT 3250 Echocardiography Principles
  - 4 - CVT 3350 Vascular Sonography Principles
  - 3 - HLTH 3800 Epidemiology
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 
- 14

**Second Semester**

- 4 - CVT 3260 Echocardiography Methods
  - 4 - CVT 3360 Vascular Sonography Methods
  - 3 - HEHD 4100 Leadership Behavior and Civil Engagement
  - 3 - HLTH 4900 Research and Evaluation Strategies for Public Health
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 17

**Summer**

- 3 - CVT 4240 Introduction to Field Experience

**Senior Year****First Semester**

- 6 - CVT 4250 CVS Field Experience II
  - 3 - HLTH 4180 CVT Professional Development
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
- 
- 12

**Second Semester**

- 6 - CVT 4260 CVS Field Experience III
  - 3 - HEHD 4200 Leadership Appl. and Experience
  - 3 - Health Requirement<sup>4</sup>
- 
- 12

122-125 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credits must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>MATH 1010, 1020, or 1060

<sup>3</sup>STAT 2300 or 3090

<sup>4</sup>Any HLTH course not otherwise required.

Note: A minimum grade-point average of 2.0 is required for registration in each HLTH course.

**PREPROFESSIONAL HEALTH STUDIES CONCENTRATION****Freshman Year****First Semester**

- 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Lab. I *or*  
5 - BIOL 1100 Principles of Biology I
  - 4 - CH 1010 General Chemistry
  - 3 - HLTH 2020 Introduction to Public Health
  - 3 - Social Science Requirement<sup>1</sup>
- 
- 14-15

**Second Semester**

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Lab. II *or*  
5 - BIOL 1110 Principles of Biology II
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - HLTH 2030 Overview of Health Care Systems
  - 3-4 - Mathematics Requirement<sup>2</sup>
- 
- 17-19

**Sophomore Year****First Semester**

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 3 - HLTH 2980 Human Health and Disease
  - 3 - Guided Requirement<sup>3</sup>
  - 3 - Health Requirement<sup>4</sup>
  - 3 - Statistics Requirement<sup>5</sup>
- 
- 16

**Second Semester**

- 4 - BIOL 2230 Human Anatomy and Phys. II
  - 3 - COMM 1500 Intro. to Human Comm. *or*  
3 - COMM 2500 Public Speaking
  - 3 - HLTH 2400 Determinants of Health Behavior
  - 3 - Social Science Requirement<sup>1</sup>
  - 3 - Elective<sup>6</sup>
- 
- 16

**Junior Year****First Semester**

- 3 - HLTH 3800 Epidemiology
  - 3 - PHYS 2070 General Physics I
  - 1 - PHYS 2090 General Physics I Lab.
  - 4 - Guided Requirement<sup>3</sup>
  - 3 - Health Requirement<sup>4</sup>
  - 1 - Elective<sup>6</sup>
- 
- 15

**Second Semester**

- 1 - HLTH 4190 Health Science Internship Preparation Seminar
  - 3 - HLTH 4900 Research and Evaluation Strategies for Public Health
  - 3 - PHYS 2080 General Physics II
  - 1 - PHYS 2100 General Physics II Lab.
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 4 - Guided Requirement<sup>3</sup>
- 
- 15

**Senior Year****First Semester**

- 5 - HLTH 4200 Health Science Internship<sup>7</sup>
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Health Requirement<sup>4</sup>
  - 3 - Elective<sup>6</sup>
- 
- 14

**Second Semester**

- 3 - Guided Requirement<sup>3</sup>
  - 3 - Health Requirement<sup>4</sup>
  - 7 - Elective<sup>6</sup>
- 
- 13

120-123 Total Semester Hours

<sup>1</sup>See General Education Requirements. Six of these credit hours must also satisfy the Cross-Cultural Awareness and Science and Technology in Society Requirements.

<sup>2</sup>MATH 1010, 1020, or 1060

<sup>3</sup>See advisor. Courses in Spanish are strongly recommended.

<sup>4</sup>Any HLTH course not otherwise required

<sup>5</sup>STAT 2300 or 3090

<sup>6</sup>Physician's Assistant, predentistry, and premedicine students may also need BCHM 3010 and eight credit hours of organic chemistry. Some programs also require a course in microbiology.

<sup>7</sup>Internship must be completed in one or two semesters. Internship may be done fall, spring, or summer after completing HLTH 4190. Prior approval is required for summer internships. A grade-point average of 2.0 is required for registration.

Note: A minimum grade-point average of 2.0 is required for registration in each HLTH course.

**LANGUAGE AND INTERNATIONAL HEALTH****Bachelor of Science**

The Language and International Health program is administered by the College of Architecture, Arts and Humanities and the College of Health, Education and Human Development. See page 68 for the curriculum.

**NURSING****Bachelor of Science**

The Bachelor of Science degree program in Nursing prepares students for professional nursing practice in a variety of settings, such as hospitals, industry, clinics, and public health agencies. During the first two years, emphasis is on liberal arts and basic science courses arranged to provide a foundation for the nursing major. Junior and senior courses emphasize the study of nursing. Clinical nursing experiences, guided by the Nursing faculty, involve acute and community-based settings. Students are responsible for their own transportation to clinical laboratory experiences, which may extend throughout the Upstate.

Throughout the clinical laboratory period, Nursing majors are required to carry current, valid student nurses' professional liability insurance with minimum limits of liability of \$1,000,000 per occurrence and \$6,000,000 in aggregate. Documentation of such coverage must be provided to the Director of the School of Nursing. No student may participate in clinical learning activities without this insurance coverage.

To comply with clinical agency contract requirements and South Carolina law, students enrolled in nursing courses with a clinical laboratory must meet specific requirements listed in the *School of Nursing Student Handbook* at [www.clemson.edu/hehd/nursing](http://www.clemson.edu/hehd/nursing).

The School of Nursing programs are accredited by the CCNE (Commission on Collegiate Nursing Education), One Dupont Circle NW, Suite 530, Washington, DC 20036-1120.

**Entrance Requirements**

To facilitate admission of students who can achieve at an appropriate level in the program, admission is selective. Consideration is given to performance in secondary school and on the College Board Examination (SAT). Those seeking admission are advised to apply to the University early in the fall of the senior year in high school.

Transfer admission is competitive. Students are encouraged to apply early to the Office of Admissions. The University admits ten new transfer students to the Nursing major during the fall semester only. Potential students should have a minimum grade point average of 3.0 and completion of 30 semester hours of transferable courses. Placement in the

Nursing curriculum will be determined after credit evaluation is completed.

Students may change majors into Nursing based on approval of an Admissions Committee in the School of Nursing. Applications are accepted each year during January with a deadline of January 31. Decisions are made by February 28. Change-of-major students will have a start date of the following January into upper division (junior-level) nursing courses. Applicants should meet the following requirements prior to the semester of application: a minimum cumulative grade-point average of 2.75, completion of a minimum of two required sciences in the Nursing curriculum with a C or better. Selection priority is based on grade-point average and number of completed nursing prerequisites. Students are allowed to apply only twice. Information regarding the admission process to the Accelerated Second Degree nursing program can be found on the School of Nursing website.

Detailed information is available from the Academic Advising Center in 309 Edwards Hall or at [www.clemson.edu/hehd/nursing](http://www.clemson.edu/hehd/nursing).

## Freshman Year

### First Semester<sup>1</sup>

- 3 - BIOL 1030 General Biology I
- 1 - BIOL 1050 General Biology Lab. I
- 3 - COMM 1500 Intro. to Human Comm. *or*
- 3 - COMM 2500 Public Speaking

- 2 - NURS 1020 Nursing Success Skills
  - 3 - NURS 1400 Computer Appl. in Health Care<sup>2</sup>
  - 3 - SOC 2010 Introduction to Sociology
- 15

### Second Semester

- 4 - CH 1010 General Chemistry I
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - PSYC 2010 Introduction to Psychology
  - 3 - STAT 2300 Statistical Methods I
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>3</sup>
- 16

## Sophomore Year

### First Semester

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 4 - MICRO 2050 Introductory Microbiology *or*
  - 4 - MICR 3050 General Microbiology
  - 3 - NUTR 2050 Nutrition for Nursing Professionals
  - 3 - Arts and Humanities (Literature) Requirement<sup>3</sup>
- 1 - Elective
- 15

### Second Semester

- 4 - BIOL 2230 Human Anatomy and Phys. II
  - 3 - NURS 3200 Professionalism in Nursing
  - 3 - NURS (HCG) 3330 Health Care Genetics
  - 3 - Cross-Cultural Awareness Requirement<sup>3,4</sup>
  - 2 - Elective
- 15

## Junior Year

### First Semester

- 3 - ENGL 3040 Business Writing *or*
  - 3 - ENGL 3140 Technical Writing *or*
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 3 - NURS 3040 Pathophysiology for Health Care Professionals
  - 3 - NURS 3100 Health Assessment
  - 4 - NURS 3120 Medical-Surgical I: Foundations of Nursing
  - 3 - NURS 3400 Pharmacotherapeutic Nursing Interventions
- 16

### Second Semester

- 7 - NURS 3030 Medical-Surg. II: Nursing of Adults
  - 3 - NURS 3050 Psychosocial Nursing
  - 2 - NURS 3110 Health Promo. Across the Lifespan<sup>5</sup>
  - 2 - NURS 3230 Gerontology Nursing
  - 3 - NURS 3300 Research in Nursing
- 17

## Senior Year

### First Semester

- 5 - NURS 4010 Mental Health Nursing
  - 5 - NURS 4110 Nursing Care of Children
  - 5 - NURS 4120 Nursing Care of Women and Their Families
- 15

### Second Semester

- 5 - NURS 4030 Medical-Surgical III: Complex Nursing of Adults
  - 6 - NURS 4100 Leadership Management and Nursing Care Practicum
  - 5 - NURS 4140 Community Health Nursing and Health Promotion<sup>5</sup> *or*
  - 4 - NURS 4150 Community Health Nursing<sup>5</sup>
- 15 *or* 16
- 124 *or* 125 Total Semester Hours

<sup>1</sup>Students scoring below the designated score on the CMPT must take MATH 1010 as a prerequisite for CH 1010 during this semester.

<sup>2</sup>Students enrolled at the University Center of Greenville may substitute CPSC 1200.

<sup>3</sup>See General Education Requirements.

<sup>4</sup>If this requirement is satisfied by another course in the curriculum, elective hours must be taken to cover the credit hours.

<sup>5</sup>Students enrolled at the University Center of Greenville will substitute NURS 4140 for NURS 3110 and 4150.

#### Notes:

1. A minimum grade of a C is required in the following courses for progression to junior year clinical courses: BIOL 1030/1050, 2220, 2230, CH 1010, MICR 2050, 3050, MATH 1010, NUTR 2050, STAT 2300.
2. A minimum grade of C is required in all nursing courses.
3. To progress to junior-level nursing courses, students must have a minimum grade-point average of 2.5 and may not have received more than two final course grades of less than a C in the last five years.
4. A minimum nursing grade-point average of 2.5 must be achieved in all required nursing (NURS) courses for progression to the next level. The nursing GPA will include only NURS courses.
5. Students may repeat only one nursing course. Further, students may repeat that nursing course one time only. Withdrawing with a W from the course or applying Academic Forgiveness counts as an attempt. Students who are unsuccessful on the second attempt in a nursing course will be counseled to select another major and will not be permitted to continue in the Nursing program.
6. Students must pass didactic and clinical components to pass all clinical courses.

## Registered Nurse BS Completion Program

The RN/BS curriculum offers an individualized study option for the registered nurse to obtain a baccalaureate degree in Nursing. Credits may be earned through an accelerated program of study, combining transfer credits for selected courses from accredited institutions of higher learning, credit by examination for previously completed nursing courses, and enrollment in courses at Clemson University. Qualified students may take up to six hours of graduate courses towards the master's degree in Nursing. Registered nurses interested in pursuing a baccalaureate degree should contact the School of Nursing for curriculum requirements. This program is offered at the University Center of Greenville.

## Freshman Year

### First Semester

- 3 - BIOL 1030 General Biology I *and*
  - 1 - BIOL 1050 General Biology Laboratory I *or*
  - 4 - CH 1010 General Chemistry
  - 3 - CPSC 1200 Introduction to Info. Tech. *or*
  - 3 - NURS 1400 Computer App. in Nursing
  - 3 - SOC 2010 Introduction to Sociology
  - 3 - STAT 2300 Statistical Methods I<sup>1</sup>
  - 3 - Elective
- 16

### Second Semester

- 3 - BIOL 1040 General Biology II *and*
  - 1 - BIOL 1060 General Biology Laboratory II *or*
  - 4 - CH 1020 General Chemistry
  - 3 - ENGL 1030 Accelerated Composition
  - 3 - PSYC 2010 Introduction to Psychology
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>2</sup>
  - 3 - Elective
- 16

## Sophomore Year

### First Semester

- 4 - BIOL 2220 Human Anatomy and Phys. I
  - 4 - MICR 2050 Introductory Microbiology *or*
  - 4 - MICR 3050 General Microbiology
  - 3 - Arts and Humanities (Literature) Requirement<sup>2</sup>
  - 4 - Elective
- 15

### Second Semester

- 4 - BIOL 2230 Human Anatomy and Phys. II
  - 3 - COMM 1500 Intro. to Human Comm. *or*
  - 3 - COMM 2500 Public Speaking
  - 3 - NUTR 2030 Introduction to Principles of Human Nutrition *or*
  - 3 - NUTR 2050 Nutrition for Nursing Prof.
  - 5 - Elective
- 15

## Junior Year

### First Semester

- 3 - ENGL 3040 Business Writing *or*
  - 3 - ENGL 3140 Technical Writing *or*
  - 3 - ENGL 3150 Scientific Writing and Comm.
  - 3 - NURS 3040 Pathophysiology for Health Care Professionals
  - 3 - NURS 3190 Health Assessment for RNs
  - 3 - NURS 4060 Issues in Professionalism
  - 3 - Nursing Requirement<sup>3</sup>
- 15

**Second Semester**

- 7 - NURS 3030 Medical-Surg. II: Nursing of Adults<sup>4</sup>  
 3 - NURS 3300 Research in Nursing  
 5 - NURS 4110 Nursing Care of Children<sup>4</sup>  
 15

**Senior Year****First Semester**

- 4 - NURS 3070 Family Nursing in the Community  
 3 - NURS (HCG) 3330 Health Care Genetics  
 5 - NURS 4030 Medical-Surgical III: Complex Nursing of Adults<sup>4</sup>  
 5 - NURS 4120 Nurs. Care of Women and Families<sup>4</sup>  
 17

**Second Semester**

- 4 - NURS 3120 Medical-Surgical I: Therapeutic Nursing Interventions<sup>4</sup>  
 5 - NURS 4010 Mental Health Nursing<sup>4</sup>  
 3 - NURS 4050 Leadership and Mgt. in Nursing  
 4 - NURS 4250 Community Nursing  
 16

125 Total Semester Hours

<sup>1</sup>STAT 3090 may be substituted.

<sup>2</sup>See General Education Requirements. Three of these credit hours must also satisfy the Cross-Cultural Awareness Requirement.

<sup>3</sup>NURS 3340 or 4160.

<sup>4</sup>This course is exempt if the student achieves a B or better in NURS 4060.

**Notes:**

1. A minimum grade of C is required in the following courses to progress in the program: CH 1010, 1020, BIOL 1030, 1040, 1050, 1060, 2220, 2230, NUTR 2030, 2050, STAT 2300, and all courses with a NURS subject code.
2. A minimum grade-point average of 2.5 must be achieved in all required nursing (NURS) courses for progression to the next level. The nursing GPA will include all courses with a NURS subject code.

**PARKS, RECREATION AND TOURISM MANAGEMENT****Bachelor of Science**

The Department of Parks, Recreation and Tourism Management prepares students for a variety of careers in public and private leisure services. The curriculum provides a broad exposure to the management of leisure service programs and resources, such as those for municipalities, institutions, voluntary and youth-serving agencies, management positions within the travel and tourism industry and as resource managers of local, state, and federal parks and related lands and waters.

The curriculum allows students to select from five concentrations. This latitude permits accommodation of each student's career objectives in positions in community recreation, sport management, recreation programming, cultural arts management, commercial recreation, wilderness management, nature interpretation, park management, historic site management, rehabilitation services, leisure counseling, camp administration, recreation therapy, programs for people with disabilities or senior citizens, travel industry, resort management, convention and visitor bureaus, theme parks, community tourism, and special event/festival planning, to name a few.

The Parks, Recreation and Tourism Management program is accredited by the National Council on Accreditation (National Recreation and Park Association/Council on Postsecondary Accreditation). Graduates are immediately eligible to apply to become "Certified Park and Recreation Professionals," a valuable credential for professional advancement.

When space is available, a student may change majors to one of the degree concentrations in the Department of Parks, Recreation and Tourism Management with a 2.0 cumulative grade-point average and approval of the department chair or his/her designee. Students are encouraged to speak with the PRTM advisor about changing their major prior to the start of their sophomore year to avoid a delay in graduation due to course sequencing and course prerequisite requirements.

Graduate degrees offered are Master of Parks, Recreation and Tourism Management; Master of Science; and Doctor of Philosophy.

**COMMUNITY RECREATION, SPORT AND CAMP MANAGEMENT CONCENTRATION**

The Community Recreation, Sport and Camp Management (CRSCM) Concentration prepares students for careers in community recreation, amateur athletics, and camp management by developing theoretical, conceptual, and applied knowledge bases necessary for success in its diverse field. The focus of this program is on community, family, and individual development. Career opportunities include, but are not limited to, community recreation programming, community athletic programming, camp administration, facility operation and management, special events, campus recreation, and fitness and wellness programming.

**Freshman Year****First Semester**

- 3 - Cross-Cultural Awareness, Science and Tech. in Society, or Other General Ed. Req.<sup>1</sup>  
 3 - Mathematics Requirement<sup>1</sup>  
 4 - Natural Science Requirement<sup>1</sup>  
 6 - Social Science Requirement<sup>1</sup>  
 16

**Second Semester**

- 1 - PRTM 2000 Profession and Practice in PRTM  
 2 - PRTM 2200 Conceptual Foundations of PRTM  
 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>  
 3 - English Composition Requirement<sup>1</sup>  
 3 - Mathematics or Natural Science Requirement<sup>1</sup>  
 3 - Oral Communication Requirement<sup>1</sup>  
 15

**Sophomore Year****First Semester**

- 1 - PRTM 1980 Creative Inquiry—PRTM I  
 6 - PRTM 2260 Foundation of Management and Administration in PRTM  
 5 - PRTM 2270 Provisi .  
 3 - PRTM 2290 Distributed Competency Integration in PRTM  
 15

**Second Semester**

- 3 - PRTM 2410 Introduction to Community Recreation, Sport and Camp Management  
 2 - PRTM 2980 Creative Inquiry—PRTM II  
 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>  
 6 - Concentration Requirement<sup>2</sup>  
 1 - Elective  
 15

**Summer**

- 1 - PRTM 2060 Practicum I  
 1 - PRTM 2070 Practicum II  
 2

**Junior Year****First Semester**

- 2 - PRTM 3980 Creative Inquiry—PRTM III  
 1 - PRTM 4040 Field Training I  
 12 - Concentration Requirement<sup>2</sup>  
 15

**Second Semester**

- 1 - PRTM 4980 Creative Inquiry—PRTM IV  
 9 - Concentration Requirement<sup>2</sup>  
 2 - Elective  
 12

**Summer**

- 6 - PRTM 4050 Field Training II

**Senior Year****First Semester**

- 12 - Concentration Requirement<sup>2</sup>  
 12

**Second Semester**

- 6 - Concentration Requirement<sup>2</sup>  
 6 - Elective  
 12

120 Total Semester Hours

<sup>1</sup>See General Education Requirements and advisor. Clemson University requires a total of 33 credit hours of General Education, including two credits of Academic and Professional Development (satisfied by PRTM 2060 and 2070). Students must take at least 31 additional credits of General Education as outlined in the *Undergraduate Announcements* General Education section.

<sup>2</sup>See advisor.

**PARKS AND CONSERVATION AREA MANAGEMENT CONCENTRATION**

Students in Park Conservation Area Management (PCAM) prepare for work as park rangers, planners, educators, law enforcement officers, and administrators of our nation's federal, state, and county public lands that hold unique natural, cultural, and historic resources. PCAM focuses on helping visitors enjoy and appreciate parklands while protecting those resources for future generations. Besides taking coursework in PRTM, many students choose to complete a minor field of study in forest resource management, wildlife and fisheries biology, history, or anthropology.

**Freshman Year****First Semester**

- 3 - Cross-Cultural Awareness, Science and Tech. in Society, or Other General Ed. Req.<sup>1</sup>
  - 3 - Mathematics Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>1</sup>
  - 6 - Social Science Requirement<sup>1</sup>
- 16

**Second Semester**

- 1 - PRTM 2000 Profession and Practice in PRTM
  - 2 - PRTM 2200 Conceptual Foundations of PRTM
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - English Composition Requirement<sup>1</sup>
  - 3 - Mathematics or Natural Science Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 15

**Sophomore Year****First Semester**

- 1 - PRTM 1980 Creative Inquiry—PRTM I
  - 6 - PRTM 2260 Foundations of Management, Admin. and Programming in Leisure Skills
  - 5 - PRTM 2270 Provision of Leisure Service Exp.
  - 3 - PRTM 2290 Competency Integration in PRTM
- 15

**Second Semester**

- 3 - PRTM 2700 Introduction to Recreation Resources Management
  - 2 - PRTM 2980 Creative Inquiry—PRTM II
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 6 - Concentration Requirement<sup>2</sup>
- 1 - Elective  
15

**Summer**

- 1 - PRTM 2060 Practicum I
  - 1 - PRTM 2070 Practicum II
- 2

**Junior Year****First Semester**

- 2 - PRTM 3980 Creative Inquiry—PRTM III
  - 1 - PRTM 4040 Field Training I
- 12 - Concentration Requirement<sup>2</sup>  
15

**Second Semester**

- 1 - PRTM 4980 Creative Inquiry—PRTM IV
  - 9 - Concentration Requirement<sup>2</sup>
  - 2 - Elective
- 12

**Summer**

- 6 - PRTM 4050 Field Training II

**Senior Year****First Semester**

- 12 - Concentration Requirement<sup>2</sup>
- 12

**Second Semester**

- 6 - Concentration Requirement<sup>2</sup>
  - 6 - Elective
- 12
- 120 Total Semester Hours

<sup>1</sup>See General Education Requirements and advisor. Clemson University requires a total of 33 credit hours of General Education, including two credits of Academic and Professional Development (satisfied by PRTM 2060 and 2070). Students must take at least 31 additional credits of General Education as outlined in the *Undergraduate Announcements* General Education section.

<sup>2</sup>See advisor.

**PROFESSIONAL GOLF MANAGEMENT CONCENTRATION**

The Professional Golf Management (PGM) Concentration provides a unique educational background for students who desire to become PGA professionals. Students obtain specialized knowledge and skills which prepare them to become leaders in the golf industry. The PGM Concentration combines academics, career training, and extensive internship experience to develop well-rounded, service-oriented professionals who can meet and respond to the personal as well as business management requirements of golf programs and facilities. See advisor for new/ additional General Education Requirements.

**Freshman Year****First Semester**

- 1 - PRTM 1950 PGM Seminar I
  - 3 - Mathematics Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>1</sup>
  - 6 - Social Science Requirement<sup>1</sup>
  - 2 - Elective
- 16

**Second Semester**

- 1 - PRTM 2000 Profession and Practice in PRTM
  - 2 - PRTM 2200 Conceptual Foundations of PRTM
  - 3 - PRTM 2810 Introduction to Golf Management
  - 3 - PRTM 2820 Principles of Golfer Development
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - English Composition Requirement<sup>1</sup>
  - 3 - Mathematics or Natural Science Requirement<sup>1</sup>
- 18

**Summer**

- 0 - CO-OP 2010 Cooperative Education
  - 1 - PRTM 2060 Practicum I
- 1

**Sophomore Year****First Semester**

- 1 - PRTM 1980 Creative Inquiry—PRTM I
  - 6 - PRTM 2260 Foundations of Management and Administration in PRTM
  - 5 - PRTM 2270 Provision of Leisure Service Exp.
  - 3 - PRTM 2290 Distributed Competency Integration in PRTM
  - 1 - PRTM 2950 PGM Seminar II
- 16

**Second Semester**

- 3 - PRTM 2830 Advanced Methods of Teaching Golf
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 3 - Concentration Requirement<sup>2</sup>
  - 3 - Cross-Cultural Awareness, Science and Tech. in Society, or Other General Education Req.<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 15

**Summer**

- 0 - COOP 2020 Cooperative Education
- 0

**Junior Year****First Semester**

- 0 - COOP 2030 Cooperative Education
  - 1 - PRTM 2070 Practicum II
- 1

**Second Semester**

- 3 - PRTM 3830 Golf Shop Operations
  - 9 - Concentration Requirement<sup>2</sup>
  - 4 - Elective
- 16

**Senior Year****First Semester**

- 16 - Concentration Requirement<sup>2</sup>
- 16

**Second Semester**

- 0 - COOP 2040 Cooperative Education
- 0

**Summer**

- 0 - COOP 2050 Cooperative Education
  - 6 - PRTM 4050 Field Training II
- 6

**Fifth Year****First Semester**

- 2 - PRTM 3950 PGM Seminar III
  - 3 - PRTM 4830 Golf Club Management and Operations
  - 12 - Concentration Requirement<sup>2</sup>
- 17

122 Total Semester Hours

<sup>1</sup>See General Education Requirements and advisor. Clemson University requires a total of 33 credit hours of General Education, including two credits of Academic and Professional Development (satisfied by PRTM 2060 and 2070). Students must take at least 31 additional credits of General Education as outlined in the *Undergraduate Announcements* General Education section.

<sup>2</sup>See advisor.

**RECREATIONAL THERAPY CONCENTRATION**

The Recreational Therapy (RT) Concentration prepares students for exciting careers working with people with disabilities in a variety of settings, including community-based recreation agencies, camps, children's hospitals, psychiatric and physical rehabilitation hospitals, and assisted-living facilities, to name a few. Recreational Therapy consists of the delivery of recreation services designed to enhance participants' leisure experiences, quality of life, and functional capabilities. Students who complete these requirements will be eligible to sit for an examination to become a Certified Therapeutic Recreation Specialist (CTRS). Students take courses and preceptorships at the University Center and agencies in Greenville, SC and the surrounding area, during their junior year.

**Freshman Year****First Semester**

- 3 - Cross-Cultural Awareness, Science and Tech. in Society, or Other General Education Req.<sup>1</sup>
  - 3 - Mathematics Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>1</sup>
  - 6 - Social Science Requirement<sup>1</sup>
- 16

**Second Semester**

- 1 - PRTM 2000 Profession and Practice in PRTM
  - 2 - PRTM 2200 Conceptual Foundations of PRTM
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - English Composition Requirement<sup>1</sup>
  - 3-4 - Mathematics or Natural Science Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 15-16

**Sophomore Year****First Semester**

- 1 - PRTM 1980 Creative Inquiry—PRTM I
  - 6 - PRTM 2260 Foundations of Management and Administration in PRTM
  - 5 - PRTM 2270 Provision of Leisure Service Exp.
  - 3 - PRTM 2290 Distributed Competency Integration in PRTM
- 15

**Second Semester**

- 2 - PRTM 2980 Creative Inquiry—PRTM II
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
- 10 - Concentration Requirement<sup>2</sup>
- 15

**Summer**

- 1 - PRTM 2060 Practicum I
  - 1 - PRTM 2070 Practicum II
- 2

**Junior Year****First Semester**

- 2 - PRTM 3980 Creative Inquiry—PRTM III
- 14 - Concentration Requirement<sup>2</sup>
- 16

**Second Semester**

- 1 - PRTM 4980 Creative Inquiry—PRTM IV
- 12 - Concentration Specific Requirement<sup>2</sup>
- 13

**Summer**

- 6 - PRTM 4050 Field Training II

**Senior Year****First Semester**

- 7 - Concentration Requirement<sup>2</sup>
  - 5 - Elective
- 12

**Second Semester**

- 6 - Concentration Requirement<sup>2</sup>
  - 6 - Elective
- 12
- 122-123 Total Semester Hours

<sup>1</sup>See General Education Requirements and advisor. Clemson University requires a total of 33 credit hours of General Education, including two credits of Academic and Professional Development (satisfied by PRTM 2060 and 2070). Students must take at least 31 additional credits of General Education as outlined in the *Undergraduate Announcements* General Education section. See your advisor for choosing general education requirements that meet the prerequisites for the Recreational Therapy concentration specific classes.

<sup>2</sup>See advisor.

**TRAVEL AND TOURISM CONCENTRATION**

The Travel and Tourism (T&T) Concentration prepares students for interesting and challenging careers working in one of the world's most diverse and dynamic industries. Students in this concentration are introduced to issues pertaining to the management, planning, and promotion of places and events such as tourist attractions. The program is designed to provide an understanding of the linkages that exist between local communities, their populations, and various public, private, and special interest groups. Students in Travel and Tourism can pursue careers in private sector enterprises, government agencies, convention and visitor bureaus, as well as other tourism-affiliated organizations.

**Freshman Year****First Semester**

- 3 - Cross-Cultural Awareness, Science and Tech. in Society, or other General Education Req.<sup>1</sup>
  - 3 - Mathematics Requirement<sup>1</sup>
  - 4 - Natural Science Requirement<sup>1</sup>
  - 6 - Social Science Requirement<sup>1</sup>
- 16

**Second Semester**

- 1 - PRTM 2000 Profession and Practice in PRTM
  - 2 - PRTM 2200 Conceptual Foundations of PRTM
  - 3 - Arts and Humanities (Non-Lit.) Requirement<sup>1</sup>
  - 3 - English Composition Requirement<sup>1</sup>
  - 3 - Mathematics or Natural Science Requirement<sup>1</sup>
  - 3 - Oral Communication Requirement<sup>1</sup>
- 15

**Sophomore Year****First Semester**

- 1 - PRTM 1980 Creative Inquiry—PRTM I
  - 6 - PRTM 2260 Foundations of Management and Administration in PRTM
  - 5 - PRTM 2270 Provision of Leisure Service Exp.
  - 3 - PRTM 2290 Distributed Competency Integration in PRTM
- 15

**Second Semester**

- 2 - PRTM 2980 Creative Inquiry—PRTM II
  - 3 - PRTM 3420 Introduction to Tourism
  - 3 - Arts and Humanities (Literature) Requirement<sup>1</sup>
  - 6 - Concentration Requirement<sup>2</sup>
  - 1 - Elective
- 15

**Summer**

- 1 - PRTM 2060 Practicum I
  - 1 - PRTM 2070 Practicum II
- 2

**Junior Year****First Semester**

- 2 - PRTM 3980 Creative Inquiry—PRTM III
  - 1 - PRTM 4040 Field Training I
- 12 - Concentration Requirement<sup>2</sup>
- 15

**Second Semester**

- 1 - PRTM 4980 Creative Inquiry—PRTM IV
  - 9 - Concentration Requirement<sup>2</sup>
  - 2 - Elective
- 12

**Summer**

- 6 - PRTM 4050 Field Training II

**Senior Year****First Semester**

- 12 - Concentration Requirement<sup>2</sup>
- 12

**Second Semester**

- 6 - Concentration Requirement<sup>2</sup>
  - 6 - Elective
- 12
- 120 Total Semester Hours

<sup>1</sup>See General Education Requirements and advisor. Clemson University requires a total of 33 credit hours of General Education, including two credits of Academic and Professional Development (satisfied by PRTM 2060 and 2070). Students must take at least 31 additional credits of General Education as outlined in the *Undergraduate Announcements* General Education section.

<sup>2</sup>See advisor.

## MINORS

Following are minors acceptable for students in the College of Health, Education and Human Development. Students cannot major and minor in the same field or acquire a minor that is not allowed by the degree program.

Accounting	Management
Adult/Extension Education	Management Information Systems
Aerospace Studies	Mathematical Sciences— <i>not open to Mathematics Teaching or Secondary Education—Mathematics majors</i>
Agricultural Business Management	Microbiology
Agricultural Mechanization and Business	Military Leadership
American Sign Language Studies	Modern Languages
Animal and Veterinary Sciences	Music
Anthropology	Natural Resource Economics
Architecture	Nonprofit Leadership
Art	Packaging Science
Athletic Leadership	Pan African Studies
Biochemistry	Park and Protected Area Management
Biological Sciences— <i>not open to Science Teaching—Biological Sciences majors</i>	Philosophy
Business Administration	Physics— <i>not open to Science Teaching—Physical Sciences or Science Teaching—Physics majors</i>
Chemistry— <i>not open to Science Teaching—Chemistry majors</i>	Plant Pathology
Cluster	Political Science
Communication Studies	Psychology
Computer Science	Public Policy
Crop and Soil Environmental Science	Recreational Therapy
Digital Production Arts	Religion
East Asian Studies	Russian Area Studies
Economics	Science and Technology in Society
Education	Screenwriting
English— <i>not open to Secondary Education—English majors</i>	Sociology
Entomology	Spanish-American Area Studies
Entrepreneurship	Sustainability
Environmental Science and Policy	Theatre
Equine Industry	Travel and Tourism
Film Studies	Turfgrass
Financial Management	Urban Forestry
Food Science	Wildlife and Fisheries Biology
Forest Products	Women's Studies
Forest Resource Management	Writing
Genetics	
Geography	
Geology	
Global Politics	
Great Works	
History— <i>not open to Secondary Education: Social Studies (History) majors</i>	
Horticulture	
Human Resource Management	
Legal Studies	

See pages 39-42 for details.

## COURSES OF INSTRUCTION

This list includes for each course the subject abbreviation, catalog number, title, credit hours, class or laboratory hours per week, description, requirements and prerequisites.

### 4000/6000-Level Courses

4000-level courses with a 6000-level counterpart are identified with an asterisk. Students should refer to the *Graduate Announcements* for the 6000-level description and requirements.

### Cross-Referenced Courses

A cross-referenced course is one that can be taken for credit under different departmental subjects. For example, students can take *Herpetology* as either BIOL 4680 or WFB 4680. The student should select the desired departmental subject abbreviation in conference with an advisor. The departmental subject abbreviation may be changed only during the period allowed by the University calendar for adding a course.

## COURSE ABBREVIATIONS

AAH	Art and Architectural History
ACCT	Accounting
AGED	Agricultural Education
AGM	Agricultural Mechanization
AL	Athletic Leadership
ANTH	Anthropology
APEC	Applied Economics
ARAB	Arabic
ARCH	Architecture
ART	Art
AS	Aerospace Studies
ASL	American Sign Language
ASTR	Astronomy
AUD	Audio Technology
AVS	Animal and Veterinary Sciences
BCHM	Biochemistry
BE	Biosystems Engineering
BIOE	Bioengineering
BIOL	Biology
BMOL	Biomolecular Engineering
BT	Biosystems Technology
BUS	Business
CAAH	College of Architecture, Arts and Humanities
CE	Civil Engineering
CES	College of Engineering and Science
CH	Chemistry
CHE	Chemical Engineering
CHIN	Chinese
COMM	Communication Studies
CPSC	Computer Science
CRP	City and Regional Planning
CSM	Construction Science and Management
CTE	Career and Technology Education
CU	Clemson University
CVT	Cardiovascular Technology
DANC	Dance
DPA	Digital Production Arts
DSGN	Design Studies
EAS	East Asian Studies
ECE	Electrical and Computer Engineering
ECON	Economics

ED	Education
EDC	Educational Counseling
EDEC	Early Childhood Education
EDEL	Elementary Education
EDF	Educational Foundations
EDLT	Literacy
EDSC	Secondary Education
EDSP	Special Education
EES	Environmental Engineering and Science
ELE	Executive Leadership and Entrepreneurship
EM	Engineering Mechanics
ENGL	English
ENGR	Engineering
ENR	Environmental and Natural Resources
ENSP	Environmental Science and Policy
ENT	Entomology
ETOX	Environmental Toxicology
FDSC	Food Science
FIN	Finance
FNR	Forestry and Natural Resources
FOR	Forestry
FR	French
GC	Graphic Communications
GEN	Genetics
GEOG	Geography
GEOL	Geology
GER	German
GW	Great Works
HCG	Health Care Genetics
HEHD	Health, Education and Human Development
HIST	History
HLTH	Health
HON	Honors
HORT	Horticulture
HP	Historic Preservation
HSPV	Historic Preservation (College of Charleston)
HUM	Humanities
IE	Industrial Engineering
IPM	Integrated Pest Management
IS	International Studies
ITAL	Italian
JAPN	Japanese
LANG	Language
LARC	Landscape Architecture
LATN	Latin
LAW	Law
LIB	Library
LIH	Language and International Health
LIT	Language and International Trade
LS	Leisure Skills
MATH	Mathematical Sciences
ME	Mechanical Engineering
MGT	Management
MICR	Microbiology
MKT	Marketing
ML	Military Leadership
MSE	Materials Science and Engineering
MUSC	Music
NPL	Nonprofit Leadership
NURS	Nursing
NUTR	Nutrition
PA	Performing Arts
PAS	Pan African Studies
PCPC	Pearce Center for Professional Communication
PES	Plant and Environmental Sciences
PHIL	Philosophy
PHSC	Physical Science
PHYS	Physics

PKSC	Packaging Science
PLPA	Plant Pathology
PORT	Portuguese
POSC	Political Science
PRTM	Parks, Recreation and Tourism Management
PSYC	Psychology
REL	Religion
RS	Rural Sociology
RUSS	Russian
SOC	Sociology
SPAN	Spanish
STAT	Experimental Statistics
STS	Science and Technology in Society
THEA	Theatre
WFB	Wildlife and Fisheries Biology
WS	Women's Studies
YDP	Youth Development Program

## ART AND ARCHITECTURAL HISTORY

Professor: W.W. Lew; Associate Professors: A.V. Feeser, J.B. LeBlanc; Assistant Professor: K. Kourelis

### AAH 1010 Survey of Art and Architectural History

I 3 (3) Comprehensive survey of art and architectural history of Western heritage as well as significant coverage of Asian, African, Native American, and South American art. The arts are studied within the contexts of history, geography, politics, religion, and culture. Survey includes Ancient through Gothic. Includes Honors sections.

### AAH 1020 Survey of Art and Architectural History

II 3 (3) Survey of Renaissance, Baroque, and Neoclassical art and architecture. Introduction to the Modern Movement in Europe and America. Includes Honors sections. *Preq:* AAH 1010.

### AAH 2030 History and Theory of Architecture I

3 (3) First in a two-semester sequence of special topics and issues in the history of architecture. Emphasizes architectural theory and practice in the past and present. Includes analysis of differing approaches to history: chronological, typological, thematic, phenomenological. Includes Honors sections. *Preq:* AAH 1020.

### AAH 2040 History and Theory of Architecture II

3 (3) Second of a two-semester sequence on special topics and issues in the history of architecture. Emphasizes typologies of the house, governmental buildings, and sacred architecture. Includes study of new directions in architectural historiography. Includes Honors sections. *Preq:* AAH 2030.

### AAH 2050 History and Theory of Art I

3 (3) First of a two-semester sequence on special topics and issues in the history of art. Emphasizes stylistic developments and specific art movements. Analyzes art within the larger context of social, political, and religious history. Examines art techniques and theory as they have developed. Includes Honors sections. *Preq:* AAH 1020.

### AAH 2060 History and Theory of Art II

3 (3) Second of a two-semester sequence on special topics and issues in the history of art. Continued emphasis on stylistic developments and art movements, with specific attention directed toward post-Renaissance art. Analyzes the influence of past history on modern. Includes Honors sections. *Preq:* AAH 2050.



**AAH 2100 Introduction to Art and Architecture** 3 (3) One-semester lecture survey that introduces the nonmajor to an overview of art and architecture from different time periods and cultures. Students are encouraged to appreciate the contribution to art made by the great masters and to discern different styles, art techniques, and creative traditions. Includes Honors sections.

**AAH 3050 Contemporary Art History** 3 (3) Study of contemporary art from World War II to the present, exploring forces that have shaped various movements and directions. *Preq:* AAH 2060.

**AAH 3300 Honors Colloquium** 3 (0) Undergraduate honors colloquium emphasizing interdisciplinary interpretations. Focuses on an integration of art, architecture, landscape, and city planning. *Preq:* AAH 2040 or AAH 2060.

**AAH 3950 Special Topics in Visual Studies Abroad I** 3 (3) On-site exposure to art and architecture in foreign countries, coupled with lectures and study problems. Different countries may be selected for study at faculty discretion. May be taught as a compact course during the academic year with a short stay in a foreign country or during summer with extended foreign experience. May not be taken Pass/No Pass. *Preq:* AAH 2040 or AAH 2060.

**AAH 4110\* Directed Research in Art History I** 3 (3) Comprehensive studies and research of special topics not covered in other courses. Emphasis is on field studies, research activities, and current developments in art history.

**AAH 4120\* Directed Research in Art History II** 3 (3) Continuation of AAH 4110.

**AAH 4230\* Studies in the Art and Architecture of the Renaissance I** 3 (3) Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th–18th centuries), with a study in depth of selected examples from the period. *Preq:* AAH 2040 or AAH 2060.

**AAH 4240\* Studies in the Art and Architecture of the Renaissance II** 3 (3) Consideration of the visual arts and architectural monuments of the Renaissance (Western Europe from the 15th–18th centuries), with a study in depth of selected examples from the period. *Preq:* AAH 4230.

**AAH 4300\* Twentieth Century Art I** 3 (3) Acquaints students with the major artists' monuments and issues of the Modern period in art. Through lecture/discussions and the reading of primary sources, course places the major modern movements in the context of the period (1860s–1945). *Preq:* Consent of instructor.

**AAH 4320\* Twentieth Century Art II** 3 (3) Overview of trends in art and architecture since World War II. Specific artists, artworks, and movements are presented in a socio/historic context with specific emphasis on the transition from a late-modernist to a post-modern perspective. *Preq:* Consent of instructor.

## ACCOUNTING

*Professors:* D.M. Guffey, F.A. Kennedy; *Director:* J.J. McMillan, R.E. Welton Jr.; *Associate Professors:* C.W. Hollingsworth, L.F. Schleifer, S.K. Widener; *Assistant Professors:* D.W. Dalton, N.L. Harp, J.H. Irving, R.R. Radtke; *Lecturers:* J.R. Madray, S.V. Pearce

**ACCT 2010 Financial Accounting Concepts** 3 (3) Introduction to accounting principles with emphasis on the use of financial data and analysis of financial statements. Includes Honors sections.

**ACCT 2020 Managerial Accounting Concepts** 3 (3) Introduction to managerial accounting with emphasis on using accounting information to make decisions. Includes Honors sections.

**ACCT 2040 Accounting Procedures** 1 (1) Lectures, demonstrations, and hands-on experience with accounting systems and analysis required to complete the accounting cycle and prepare financial statements. Intended for students who plan to enroll in ACCT 3030 or 3110. *Coreq:* ACCT 2041.

**ACCT 2041 Accounting Procedures Laboratory** 0 (2) Non-credit laboratory to accompany ACCT 2040. *Coreq:* ACCT 2040.

**ACCT 3030 Cost Accounting** 3 (3) Application of cost analysis to manufacturing and distributing problems; analysis of behavior characteristics of business costs and a study of principles involved in standard cost systems; lectures and problems. Includes Honors sections. *Preq:* ACCT 2010 and 2040 with a C or better.

**ACCT 3110 Intermediate Financial Accounting I** 3 (3) In-depth treatment of traditional financial accounting topics of standards setting, financial statement form and content, and accounting and reporting of current assets. Emphasizes basic theory, valuation, and measurement, as well as presentation and analysis of accounting information. Includes Honors sections. *Preq:* ACCT 2010 and 2040 with a C or better.

**ACCT 3120 Intermediate Financial Accounting II** 3 (3) Continuation of ACCT 3110. In-depth treatment of accounting and reporting for noncurrent assets, current and noncurrent liabilities, and equity. Emphasizes basic theory, valuation, and measurement issues, as well as presentation and analysis of accounting information. Includes Honors sections. *Preq:* ACCT 3110 with a C or better.

**ACCT 3130 Intermediate Financial Accounting III** 3 (3) Continuation of ACCT 3120. In-depth treatment of selected accounting topics, such as investments, cash flows, tax allocation, post-retirement benefits, leases, and error corrections. Emphasizes basic theory, valuation, and measurement, as well as presentation and analysis of accounting information. Includes Honors sections. *Preq:* ACCT 3120 with a C or better.

**ACCT 3220 Accounting Information Systems** 3 (3) Study of computer-based accounting systems with attention to systems design, application, internal control, auditing the system, and system security. *Preq:* MGT 2180.

**ACCT 3980 Creative Inquiry in Accounting** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. To be taken Pass/No Pass only.

**ACCT 3990 Internship in Accounting** 1-3 (1-3) Faculty-supervised accounting internship designed to give students learning opportunities that support their classroom experiences. Requires a minimum of six full-time weeks. Course enrollment and internship must occur in the same semester. Simultaneous credit cannot be received for another internship offering. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Junior standing and consent of instructor.

**ACCT 4040\* Individual Taxation** 3 (3) Interpretation of Federal income tax laws, regulations, and court decisions with practice in application of these laws to the returns of individuals, partnerships, and corporations. Includes Honors sections. *Preq:* ACCT 3110 with a C or better.

**ACCT 4060 Business Taxation** 3 (3) Introduction to the importance of taxation in business decision making. Emphasizes the interrelationship of taxes, the choice of business form, and various business transactions; exposes students to the breadth of business decisions which are affected by the Federal Income Tax. *Preq:* ACCT 3110 with a C or better.

**ACCT 4080 Retirement and Estate Planning** 3 (3) Provides students with an understanding of the tax consequences of personal financial, retirement, and estate planning. Subjects include the basic concepts of retirement, gift, income shifting, and estate planning. *Preq:* ACCT 4040 with a C or better.

**ACCT 4100\* Contemporary Reporting and Management Control Systems** 3 (3) Application of analyses and management control systems for contemporary business needs, including sustainability reporting, lean systems, capacity management, performance measures and incentive measures and incentive systems, and target costing. *Preq:* ACCT 3030 with a C or better.

**ACCT 4150 Auditing** 3 (3) Study of professional and practical auditing theory. Includes a review of internal controls, audit procedures, and development of audit programs for various types of businesses. Considers auditors' professional and ethical standards. *Preq:* ACCT 3110 and ACCT 3220, each with a C or better.

## AGRICULTURAL EDUCATION

*Professor:* T.R. Dobbins; *Associate Professors:* P.M. Fravel, K.D. Layfield; *Lecturer:* S. Lawrence

**AGED 1000 Orientation and Field Experience** 1 (2) Supervised observations and explanations of vocational agriculture teaching while serving as teacher aides. One full week of field experience in representative high schools is required.

**AGED 1020 Agricultural Education Freshman Seminar** 1 (2) Introduces students to the South Carolina agriculture education structure and provides opportunities to prepare oral presentations on selected agricultural education organizations. Assists students in understanding the value of professional organizations to agriculture education in the state and nation. *Preq:* Agricultural Education major.

- AGED 2000 Agricultural Applications of Educational Technology 3 (2)** Overview of microcomputer hardware and software encompassing word processing, spreadsheet, utility, Web development, and graphic communications in an agricultural context. *Coreq:* AGED 2001.
- AGED 2001 Agricultural Applications of Educational Technology Laboratory 0 (2)** Non-credit laboratory to accompany AGED 2000. *Coreq:* AGED 2000.
- AGED 2010 Introduction to Agricultural Education 3 (2)** Principles of education, development of agricultural education, and an introduction to the formulation of instructional programs for the teaching of agricultural courses. *Coreq:* AGED 2011.
- AGED 2011 Introduction to Agricultural Education Laboratory 0 (3)** Non-credit laboratory to accompany AGED 2010. *Coreq:* AGED 2010.
- AGED 2020 Agricultural Education Sophomore Seminar 1 (2)** Instruction on how to establish a comprehensive student record-keeping system. Includes integration of that data into the FFA Awards program. Allows students hands-on experience with the total FFA Awards program on the state and national level. *Preq:* AGED 1020.
- AGED 2030 Teaching Agriscience 3 (2)** Integrates biological and technological concepts appropriate for teaching introductory middle or secondary school-level courses in agricultural science. Topics emphasize disciplines, theories, and applications in modern agricultural production. Experiences include teaching techniques, materials, resources, and the design and implementation of new activities to facilitate teaching agriscience. *Preq:* BIOL 1040 and BIOL 1060. *Coreq:* AGED 2031.
- AGED 2031 Teaching Agriscience Laboratory 0 (3)** Non-credit laboratory to accompany AGED 2030. *Coreq:* AGED 2030.
- AGED 2040 Applied Agriculture Calculations 3 (3)** Demonstrates basic mathematical applications in crop and livestock production and agribusiness and financial management. These applications aid students in understanding the mathematical applications needed in the agriculture field.
- AGED 3020 Agricultural Education Junior Seminar 1 (2)** Allows students the opportunity to prepare and deliver information on Career Development Events (CDE) and to understand fully the CDE concepts. Students receive much needed hands-on experience at the state and national levels. *Preq:* AGED 2020.
- AGED 3030 Mechanical Technology for Agriculture Education 3 (2)** Study of technical content and new technology utilized in agriculture mechanics. Integrates agriculture mechanics topics such as electrical wiring and controls, green industry maintenance, irrigation systems, and agriculture construction. Offers a delivery of mechanics instruction in the classroom and laboratory setting. *Coreq:* AGED 3031.
- AGED 3031 Mechanical Technology for Agriculture Education Laboratory 0 (3)** Non-credit laboratory to accompany AGED 3030. *Coreq:* AGED 3030.
- AGED 3550 Team and Organizational Leadership in the Food and Fiber System 3 (3)** Principles and practices in planning, developing, conducting, and evaluating leadership programs for agricultural groups. Focuses on helping students better understand themselves and others; improving group communications; becoming effective leaders and members of groups; improving leadership and personal development skills; assessing leadership situations, determining and administering appropriate leadership strategies.
- AGED 3650 Multiculturalism in Agricultural Education 3 (3)** Investigation of the cultures (both domestic and foreign) commonly encountered by agriculture education professionals. Customs, traditions, beliefs, stereotypes, and myths are explored. Strategies for relationship building, impact, and successful interaction are developed for formal and informal agricultural learning environments. *Preq:* Junior standing.
- AGED 4000 Supervised Field Experience II 1 (3)** Special emphasis is placed on enhancing existing knowledge and experiences of the students. Primary focus is on becoming acquainted with the student teaching center well in advance of the customary twelve-week directed teaching experience.
- AGED 4010\* Instructional Methods in Agricultural Education 3 (2)** Appropriate methods of teaching vocational agriculture in high schools. Includes procedures for organizing teaching programs, teaching high school students, and directing FFA activities. *Coreq:* AGED 4011.
- AGED 4011\* Instructional Methods in Agricultural Education Laboratory 0 (3)** Non-credit laboratory to accompany AGED 4010. *Coreq:* AGED 4010.
- AGED 4020 Agricultural Education Senior Seminar 1 (2)** Provides an opportunity to prepare and deliver information on continuing adult education. Assists students in fully understanding the adult education component of the total Secondary Agriculture Education Program. *Preq:* AGED 3020.
- AGED 4030\* Principles of Adult/Extension Education 3 (3)** Overview of adult/extension education and adult learning. Selection of adult education providers is reviewed with emphasis on extension. *Preq:* Junior standing.
- AGED 4060 Directed Teaching 12 (36)** Guided participation in the professional responsibilities of a teacher of vocational agriculture, including intensive study of the problems encountered and competencies developed. Twelve weeks of directed teaching in selected schools are required. *Preq:* AGED 4000 and AGED 4010.
- AGED 4070 Internship in Extension and Leadership Education 6-12 (6-12)** Internship placements may include county extension offices and other appropriate extension units. Six weeks of supervised experience must be completed for six hours of credit. Twelve weeks of supervised experience must be completed for 12 hours of credit. May be repeated for a maximum of 12 credits. *Preq:* AGED 4000 and AGED 4010 and Senior standing.
- AGED 4120 Senior Agriculture Leadership Seminar 1 (2)** Emphasizes leadership techniques and policies that affect agriculture. Students conduct research and make presentations on issues which influence agriculture policy. *Preq:* APEC 3020; and one of APEC 2020 or ECON 2000 or ECON 2110.
- AGED 4150\* Leadership of Volunteers 3 (3)** Provides an overview of volunteer management. Examines the knowledge, skills, and abilities required of professional managers to involve volunteers effectively in the work of organizations.
- AGED 4160\* Ethics and Issues in Agriculture and the Food and Fiber System 3 (3)** Explores ethical theories, concepts of critical thinking, and major ethical issues in American agriculture. The major social, political, economic, and ethical issues that arise in connection to the food and fiber system are examined and potential solutions considered.
- AGED 4230\* Curriculum 3 (3)** Curriculum goals and related planning for career and continuing education programs.
- AGED 4250\* Teaching Agricultural Mechanics 2 (1)** Instruction in organizing course content, conducting and managing an agricultural mechanics laboratory, shop safety, microteaching demonstrations of psychomotor skills, and methods of teaching manipulative abilities. *Coreq:* AGED 4251.
- AGED 4251\* Teaching Agricultural Mechanics Laboratory 0 (3)** Non-credit laboratory to accompany AGED 4250. *Coreq:* AGED 4250.
- AGED 4280\* Special Studies in Agricultural Education 1-3 (1-3)** Students study, individually or collectively, selected topics and/or problems in agricultural education to meet the particular needs of the clientele enrolled. May be repeated for a maximum of six credits.
- AGED 4400\* Program Development in Adult/Extension Education 3 (3)** Principles, theory, and practice in planning and conducting educational programs in adult/extension settings. *Preq:* Junior standing.
- AGED 4500\* Modern Topics and Issues 3 (3)** Students select a major area of concern to teachers of agriculture and county agents for intensive study at least one semester prior to offering the course. When feasible, team teaching with faculty from other departments in the College of Agriculture, Forestry and Life Sciences is utilized. *Preq:* Senior standing.
- AGED 4800\* Foundations of Digital Media and Learning 3 (2)** Critical use of digital media for leadership and learning within societal and educational contexts. Course focuses on learner impact while exploring, developing, and evaluating technology-enhanced applications. Further develops competencies with new media literacies and addresses societal, cultural, ethical, and participatory issues and uses of digital media. *Coreq:* AGED 4801.
- AGED 4801\* Foundations of Digital Media and Learning Laboratory 0 (2)** Non-credit laboratory to accompany AGED 4800. *Coreq:* AGED 4800.
- AGED 4810\* Web Design for the Life Sciences and Agriculture 3 (2)** Addresses basic principles and theories of Web design and site construction, including usability and accessibility considerations. Web and graphics design software are used to develop sites suitable for life science and agricultural organizations. Service-learning is used with student projects. *Preq:* AGED 2000 and CPSC 1200. *Coreq:* AGED 4811.
- AGED 4811\* Web Design for the Life Sciences and Agriculture Laboratory 0 (2)** Non-credit laboratory to accompany AGED 4810. *Coreq:* AGED 4810.

**AGED 4820\* Advanced Educational Applications of Microcomputers** 3 (2) Provides students with the knowledge and skills needed to apply microcomputer technology to the utilization and generation of educational software in accordance with sound educational principles. *Preq:* AGED 4800 or EDF 4800. *Coreq:* AGED 4821.

**AGED 4821\* Advanced Educational Applications of Microcomputers Laboratory** 0 (2) Non-credit laboratory to accompany AGED 4820. *Coreq:* AGED 4820.

## AGRICULTURAL MECHANIZATION

*Professors:* J.P. Chastain, Y.J. Han, A. Khalilian; *Associate Professor:* C.V. Privette, III; *Assistant Professors:* D.R. Hitchcock, A. Jayakaran, K.R. Kirk, C.B. Sawyer; *Lecturer:* H. Massey; *Extension Economist:* W.N. Ferreira

**AGM 1010 Introduction to Agricultural Mechanization and Business** 1 (3) Introduces the Agricultural Mechanization and Business program. Gives an overview of the curriculum, introduces students to relevant extracurricular activities, exposes students to employment opportunities through alumni and interns, and helps students to prepare for careers relevant to the major.

**AGM 2050 Principles of Fabrication** 3 (2) Principles, techniques, and methods in the selection, proper use, and maintenance of hand and power tools. Principal topics include welding, tool fitting, metalworking, woodworking, finishing and preserving, and heat treatment. *Coreq:* AGM 2051.

**AGM 2051 Principles of Fabrication Laboratory** 0 (3) Non-credit laboratory to accompany AGM 2050. *Coreq:* AGM 2050.

**AGM 2060 Machinery Management** 3 (2) Teaches agriculture students to apply physical principles and sound reasoning to the mechanization of modern agricultural production and processing enterprises. Stresses planning efficient operational systems and wise selection of equipment, based on function and economic suitability. *Preq* or *concurrent enrollment:* MATH 1020 or MATH 1060; and PHYS 2000 or PHYS 2070. *Coreq:* AGM 2061.

**AGM 2061 Machinery Management Laboratory** 0 (3) Non-credit laboratory to accompany AGM 2060. *Coreq:* AGM 2060.

**AGM 2190 Agribusiness and Food Systems** 3 (3) Provides a general introduction to the major activities associated with the movement of agricultural and food products from producers to processors to consumers and the essential supply chain functions of buying, selling, transportation, storage, financing, standardization, pricing and risk bearing.

**AGM 2210 Surveying: Earthwork and Area Measurements** 3 (2) Fundamentals of surveying relative to earthwork and land area measurements, including linear measurements, leveling, angular measurements, and computations. Levels and total stations are used with an introduction to GPS. *Preq* or *concurrent enrollment:* MATH 1020 or MATH 1060. *Coreq:* AGM 2211.

**AGM 2211 Surveying: Earthwork and Area Measurements Laboratory** 0 (3) Non-credit laboratory to accompany AGM 2210. *Coreq:* AGM 2210.

**AGM 3010 Soil and Water Conservation** 3 (3) Soil and water management is studied by applying principles of mathematics, fluid flow, hydrology, and soil characteristics as related to soil-water-vegetation complexes in runoff, erosion control, channel design, water conservation, drainage, irrigation, stormwater best management practices and stream restoration. *Preq* or *concurrent enrollment:* MATH 1020 or MATH 1060.

**AGM 3030 Calculations for Mechanized Agriculture** 3 (2) Enhances students' ability to analyze and solve a wide range of problems requiring engineering technology. Laboratory periods introduce students to microcomputer hardware. Basic programming and typical applications to agricultural mechanization problems are included. *Preq* or *concurrent enrollment:* PHYS 2000 or PHYS 2070. *Coreq:* AGM 3031.

**AGM 3031 Calculations for Mechanized Agriculture Laboratory** 0 (3) Non-credit laboratory to accompany AGM 3030. *Coreq:* AGM 3030.

**AGM 3190 Agribusiness Decision Analysis** 3 (3) Improvement of the decision-making process in agricultural businesses through the use of decision-analysis software. Students build their own decision-making models using spreadsheets. *Preq:* AGM 2190 or APEC 3020 or APEC 3190 or MGT 2010.

**AGM 3710 Agricultural Mechanization Practicum** 1-3 (1-3) Pre-planned internship with an approved employer involved in agricultural technical or business endeavors. 130 hours of supervised responsibility are required per credit hour. A work journal, written/oral reports, company consent and evaluation must be on file. May be repeated for a maximum of twelve credits. To be taken Pass/No Pass only.

**AGM 4000 Senior Seminar in Agricultural Mechanization and Business** 1 (1) Seminar and project-based course providing information on a variety of topics of value for the development of professionals in agricultural mechanization and business and in agricultural education. Topics include development of a professional resume, professional ethics, and current topics related to agricultural technology and systems management. *Preq:* Junior or senior standing in Agricultural Mechanization and Business or in Agricultural Education.

**AGM 4020\* Landscape Drainage and Irrigation** 3 (2) Uses basic soil-water-plant relationships to determine the need for and methods of irrigation and drainage. Topics include irrigation methods, drainage needs and drainage methods. *Preq* or *concurrent enrollment:* AGM 3010. *Coreq:* AGM 4021.

**AGM 4021\* Landscape Drainage and Irrigation Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4020. *Coreq:* AGM 4020.

**AGM 4050\* Environmental Control in Animal Structures** 3 (2) Design of environmental control systems for animal production facilities. Topics include effects of the thermal and chemical environment on animals, ventilation system design, thermal design of structural envelopes, design of heating, cooling, and lighting systems. Emphasis is on practical, energy-efficient applications to modern animal production facilities. *Preq:* AGM 3030 or AVS 3010. *Coreq:* AGM 4051.

**AGM 4051\* Environmental Control in Animal Structures Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4050. *Coreq:* AGM 4050.

**AGM 4060\* Mechanical and Hydraulic Systems** 3 (2) Study of power transmission systems for agricultural production emphasizing mobile equipment. Characteristics, requirements, and design of both V-belt drive and roller-chain drives are presented. Emphasizes hydraulic power transmission systems, including pumps, actuators, control devices, and hydraulic circuitry. *Preq:* AGM 2060; and PHYS 2000 or PHYS 2070. *Coreq:* AGM 4061.

**AGM 4061\* Mechanical and Hydraulic Systems Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4060. *Coreq:* AGM 4060.

**AGM 4100\* Precision Agriculture Technology** 3 (2) Includes principles and hands-on application of technologies supporting precision agriculture. Topics include global positioning system (GPS), geographic information system software, variable rate technologies, collection of spatial data, automated guidance of equipment, spatial data mapping and analysis, remote sensing, and economic considerations. *Preq:* Junior standing. *Coreq:* AGM 4101.

**AGM 4101\* Precision Agriculture Technology Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4100. *Coreq:* AGM 4100.

**AGM 4190 Agribusiness Innovation and Entrepreneurship** 3 (3) Emphasis on assessing students' abilities as agribusiness entrepreneurs, evaluating the feasibility of a business idea, creating strategies for organizing and marketing the agricultural business, exploring pricing for products or services, developing capital needs and sound financial statements, and researching, developing, and writing a comprehensive plan for the business. May also be offered as ELE 4190. *Preq:* AGM 2190 or AGM 3190 or APEC 3020 or APEC 3190 or MGT 2010.

**AGM 4520\* Mobile Power** 3 (2) Study of tractors, emphasizing internal combustion engines and support systems necessary for their proper functioning. Also considers application of power, maintenance, adjustment, and general repair. *Preq:* PHYS 2000 or PHYS 2070. *Coreq:* AGM 4521.

**AGM 4521\* Mobile Power Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4520. *Coreq:* AGM 4520.

**AGM 4600\* Electrical Systems** 3 (2) Students in agriculture and related curricula study electric and other utilities on the farm and in the home. Emphasizes selection, installation, and maintenance of wiring systems, lighting systems, motors, controls, water systems, and waste disposal systems. *Preq:* Junior standing. *Coreq:* AGM 4601.

**AGM 4601\* Electrical Systems Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4600. *Coreq:* AGM 4600.

**AGM 4720 Capstone** 3 (2) Covers professional conduct, ethics, oral and written communication, and financial matters. Each student completes a comprehensive project on a technical subject. The results are given in a written report and oral presentation. Students use digital portfolio technology to assess their education. *Coreq:* AGM 4721.

**AGM 4721 Capstone Laboratory** 0 (3) Non-credit laboratory to accompany AGM 4720. *Coreq:* AGM 4720.

**AGM 4730 Special Topics in Agricultural Mechanization 1-3 (1-3)** Comprehensive study and application of new technologies and methods not covered in existing courses. Emphasizes independent study using innovative approaches to problem solving. May be repeated for a maximum of six credits.

## ATHLETIC LEADERSHIP

Lecturer: D. J. Cadorette

**AL 3490 Principles of Coaching 3 (3)** Investigation into the scientific basis of the coaching profession, middle and high school levels. Topics include developing a coaching philosophy, sport psychology, sport pedagogy, sport physiology, athletic administration, and risk management. Current issues regarding sportsmanship, gender equity compliance, and cultural diversity are researched and synthesized. *Preq:* Athletic Leadership minor.

**AL 3500 Scientific Basis of Coaching I: Exercise Physiology 3 (3)** Increases understanding of basic scientific information concerning athletic performance by using the conceptual approach. Focuses primarily on an in-depth investigation into the physiological principles that can enhance athletic performance. Includes phases of physical training as well as comprehensive evaluative techniques. *Preq:* AL 3490.

**AL 3520 Scientific Basis of Coaching II: Kinesiology 3 (3)** Increases understanding of basic scientific information concerning athletic movement by utilizing the conceptual approach. Deals with the basic laws of human motion necessary in evaluation of athletic movement, utilizing joint structure and anatomic landmarks as a basis for motion. *Preq:* AL 3490.

**AL 3530 Theory of Prevention and Treatment of Athletic Injuries 3 (2)** Increases understanding of principles involved in the prevention and treatment of athletic injuries. Deals with basic anatomy, first aid, and diagnostic techniques necessary for the understanding of basic athletic training procedures. *Preq:* AL 3490. *Coreq:* AL 3531.

**AL 3531 Theory of Prevention and Treatment of Athletic Injuries Laboratory 0 (3)** Non-credit laboratory to accompany AL 3530. *Coreq:* AL 3530.

**AL 3600 High School Athletics Ethical and Legal Issues 3 (3)** Investigates ethical and legal issues specific to high school athletic program administration as identified by the National Interscholastic Athletic Administrators Association (NIAAA) Leadership Program and addressed by the National Association for Sport and P.E. (NASPE) National Standards for Sport Coaches. *Preq:* AL 3490.

**AL 3610 Administration and Organization of Athletic Programs 3 (3)** Study of modern techniques and practices used in administering athletic programs. Emphasizes areas such as practice and game organization, purchase and care of equipment, budget and finances, public relations, and legal liability in athletic programs. *Preq:* AL 3490.

**AL 3620 Psychology of Coaching 3 (3)** Study of psychological techniques utilized to promote maximum athletic performance. Emphasizes motivation, coaching philosophy, athletic personality, mental preparation, and goal-oriented behavior. *Preq:* AL 3490.

**AL 3710 Coaching Baseball 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of baseball by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3720 Coaching Basketball 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of basketball by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3730 Coaching Cross Country 1 (3)** Increases understanding of technical and practical information concerning the coaching of cross country by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3740 Coaching Football 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of football by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3750 Coaching Soccer 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of soccer by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3760 Coaching Strength and Conditioning 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of strength and conditioning by utilizing the conceptual approach. Students study basic principles of coaching, training programs, and equipment appraisal as a means to improve athletic performance. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 3770 Coaching Track and Field 1 (3)** Increases understanding of basic technical and practical information concerning the coaching of track and field by utilizing the conceptual approach. Students study basic principles of coaching, competitive organization, and proper technical skills needed to improve athletic performances. Also covers total program development as it pertains to specific levels of competition. *Preq:* AL 3490.

**AL 4000 Athletic Leadership Internship 0 (3)** Athletic coaching and administration internship for a minimum of 60 hours. To be taken concurrently with any other Clemson University course. To be taken Pass/No Pass only. Students must have current CPR certification. *Preq:* Consent of Athletic Leadership coordinator.

**AL 4380 Selected Topics in Athletic Leadership 1-3 (1-3)** Specific athletic leadership topics not found in other courses are selected for in-depth study. May be repeated for a maximum of nine credits, but only if different topics are covered.

**AL 4390 Independent Study in Athletic Leadership 1-3 (1-3)** Independent study in athletic leadership under the direction of an athletic leadership faculty member. Student and faculty member develop a course of study different from any existing courses and designed for the individual student to enhance leadership skills in athletics. May be repeated for a maximum of nine credits with different course topics.

**AL 4530\* Athletic Injuries: Prevention, Assessment and Rehabilitation 3 (3)** Gives students an understanding of prevention, treatment, and rehabilitation procedures of injured athletes. *Preq:* AL 3490.

## ANTHROPOLOGY

Professor: J.M. Coggeshall; Associate Professors: M.A. Vogel, E.L. Williams, Y. Zhang; Assistant Professor: K.E. Weisensee; Adjunct Assistant Professor: L.G. Rapaport

**ANTH 2010 Introduction to Anthropology 3 (3)** Offers a four-field overview: primates and human biological origins; the development of agriculture and complex societies in the archaeological record; contemporary human societies cross-culturally; and the relationship between languages and cultures. An anthropological perspective on contemporary human problems is also presented.

**ANTH 3010 Cultural Anthropology 3 (3)** Explores human cultural diversity and current global issues. Examines food production and economic distribution, political organization, marriage and family, and religious systems in contemporary cultures. *Preq:* ANTH 2010.

**ANTH 3200 North American Indian Cultures 3 (3)** Discusses the prehistory of Native peoples, their cultural diversity at European contact, and the history and impact of that contact. Also examines contemporary issues facing Native Americans. *Preq:* ANTH 2010.

**ANTH 3310 Archaeology 4 (3)** Overview of anthropological archaeology emphasizing the scientific analyses, methodologies and theoretical approaches used by anthropological archaeologists to study the human past. Students learn about the origins and development of complex society and explore individual case studies. *Coreq:* ANTH 3311.

**ANTH 3311 Archaeology Laboratory 0 (2)** Non-credit laboratory to accompany ANTH 3310. *Coreq:* ANTH 3310.

**ANTH 3320 World Archaeology 3 (3)** Global survey of the earliest complex societies focusing on the origins of pristine states from the perspective of anthropological archaeology. Following a brief overview of archaeological methods and approaches, students learn about the origins of complex societies of Mesopotamia, the Indus Valley, Egypt, China, Mesoamerica, and the Andes.

**ANTH 3510 Biological Anthropology 3 (3)** Study of humans as biological organisms. Examines human evolution, primate social behavior, human physiological variations and disease resistance, and human skeletal anatomy and forensics. May also be offered as BIOL 3510. *Preq:* ANTH 2010 or BIOL 1100.

**ANTH 3530 Forensic Anthropology 3 (3)** Introduction to forensic anthropology, the science that utilizes methods from skeletal biology and archaeology as tools in human identification in a medico-legal context. May also be offered as BIOL 3530. *Preq:* Junior standing.

**ANTH 3710 Language and Culture 3 (3)** Surveys key topics, theories, and methodological approaches in linguistic anthropology. Examines the complex relationships among language, culture, and communicative behavior and provides students with conceptual tools that inform the study of language in its cultural contexts. May also be offered as LANG 3710.

**ANTH 4030\* Qualitative Methods 3 (3)** Methods and techniques of qualitative field research, including participant observation, ethnographic interviewing, data analysis, and report writing. *Preq:* ANTH 2010.

**ANTH 4040 Anthropological Theories 3 (3)** Examines various anthropological theories and their utility in explaining contemporary global issues. Students read, discuss and compare original theoretical works, and synthesize ideas through class writings and debates. Course is offered every other year.

**ANTH 4170 Japanese Culture and Society 3 (3)** Focuses on basic themes in Japanese culture found in social interaction and ritual behavior. Japanese social organization, including marriage and family patterns, neighborhood and community organization, and gender roles receive extensive attention. All readings and discussions are in English. May not be used to satisfy general foreign language requirements. May also be offered as JAPN 4170.

**ANTH 4180 Chinese Culture and Society 3 (3)** Examines basic cultural values and the patterns of Chinese social life. Focuses on Chinese social organization and interpersonal dynamics, including the family system, gender identities, social exchanges and networks. All readings and discussions are in English. May not be used to satisfy general foreign language requirements. May also be offered as CHIN 4180.

**ANTH 4230\* Women in the Developing World 3 (3)** Comparative anthropological study of women and their status in developing countries around the world. A survey of women's daily lives in a global context, emphasizing education, economics, and the environment. Case studies include microfinance, literacy, reproductive rights and practices, and the impact of religious fundamentalism on women. May also be offered as WS 4230. *Preq:* Sophomore standing.

**ANTH 4510 Biological Variation in Human Populations 3 (3)** Provides an in-depth discussion of the most influential topics in human skeletal biology. Course explores the history and ethical dilemmas of the field, and examines how biological anthropologists use skeletons to reconstruct patterns of diet, disease, demography and physical activity in human populations. May be offered as BIOL 4510. *Preq:* ANTH 2010.

**ANTH 4530 Human Remains Recovery 3 (3)** Provides an introduction to forensic anthropology field methods. Students locate, excavate, and recover simulated human remains, associated personal effects, and other materials from both surface scatters and simulated clandestine graves. Students also learn the basics of human identification using simulated skeletal remains. *Preq:* Consent of instructor.

**ANTH 4660\* Evolution of Human Behavior 3 (3)** Familiarizes students with the evolutionary basis of human behavior. Examines topics such as altruism, cooperation, mating systems, parental investment, and social systems using diverse examples, from hunter-gatherer to technological societies. May also be offered as BIOL 4660. *Preq:* ANTH 3510 or BIOL 3350 or BIOL 4700 or BIOL 6700 or PSYC 2010.

**ANTH 4740\* Primatology 4 (3)** Biology of nonhuman primates, including their evolution, taxonomy, physiology, life history, behavioral ecology and conservation. Three field trips are required, during which students conduct behavioral observations and later analyze their data and present it in report format. May also be offered as BIOL 4740. *Preq:* ANTH 3510, and either BIOL 1100 or both BIOL 1040 and BIOL 1060. *Coreq:* ANTH 4741.

**ANTH 4741\* Primatology Laboratory 0 (3)** Non-credit laboratory to accompany ANTH 4740. May also be offered as BIOL 4741. *Coreq:* ANTH 4740.

**ANTH 4950 Field Studies 1-6 (1-6)** Group field project in settings selected by the instructor to provide students with a variety of exposures to various cultural contexts. Archaeological digs are included. Project progress and student interpretations of findings are monitored by periodic group meetings and shared experiences. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**ANTH 4960 Creative Inquiry 1-3 (1-3)** Investigates topics in anthropology selected by faculty and students. Goals, research, and outcomes vary from semester to semester and project to project. May be repeated for a maximum of 12 credits. *Preq:* ANTH 2010 and consent of instructor.

**ANTH 4970 Senior Capstone 1 (1)** Culmination of student intellectual and professional accomplishments within the anthropology major. Students are presented with learning assessments, professional development, and reflections on their undergraduate experiences.

**ANTH 4980 Independent Study 1-3 (1-3)** Individual readings or projects in anthropological areas not covered in other courses. May be repeated for a maximum of six credits with advisor's approval. *Preq:* ANTH 2010 and consent of instructor.

## APPLIED ECONOMICS

*Professors:* D.W. Hughes, W.M. Smathers Jr.; *Associate Professors:* R.D. Lamie, D.B. Willis; *Assistant Professors:* O. Isengildina-Massa

**APEC 2020 Agricultural Economics 3 (3)** Analytical survey of the various subdivisions of agricultural economics, including farm organization, enterprise, land economics, marketing, farm prices, governmental farm policies, and the relation of agriculture to the national and international economy.

**APEC 2050 Agriculture and Society 3 (3)** Introduction to the development of world society focusing on food production, from early hunting and gathering to modern biotechnology. Covers factors driving societal growth with a global perspective. Explores systematic impacts of growth in technical capacity to produce agricultural products on farm and community organization, industrialization, and the global economy.

**APEC 2570 Natural Resources, Environment, and Economics 3 (3)** Economic principles applied to resource allocation problems related to environmental and natural resource issues.

**APEC 3020 Economics of Farm Management 3 (3)** Economic principles underlying the organization and operation of agricultural firms and related business enterprises. Particular emphasis is placed on management aspects of the farm as a production unit. *Preq:* APEC 2020 or ECON 2110.

**APEC 3090 Economics of Agricultural Marketing 3 (3)** General course in marketing agricultural commodities with particular emphasis upon food products. Analyzes efficiency criteria, consumer behavior, market organizations and institutions, and marketing functions. Includes Honors sections. *Preq:* APEC 2020 or ECON 2000 or ECON 2110.

**APEC 3130 Principles of Real Estate Appraisal 3 (3)** Introduction to basic principles and procedures of real estate appraisal. Topics include the real estate market, principles of valuation, legal concepts, and the application of the comparable sales, cost, and income approaches to real estate valuation. *Preq:* FIN 3070.

**APEC 3190 Agribusiness Management 3 (3)** Study of the principles used in making management decisions and the application of these principles in agribusiness. Emphasizes the application of economics to the solution of problems facing managers of agricultural supply and marketing firms. *Preq:* APEC 3020.

**APEC 3510 Principles of Advertising 3 (3)** Introduction to the various functions of advertising; research and audience analysis; various media formats; planning, research, and production necessary to create an advertising campaign; social effects, economic effects, and ethical considerations of advertising.

**APEC 3520 Public Finance 3 (3)** Principles of financing government, sources of public revenue, objects of public expenditures, problems of fiscal administration, and the application of fiscal policies in stabilizing the national economy. *Preq:* Junior standing.

- APEC 3570 Natural Resources Economics 3 (3)** Principles and problems involved in the use of soil, water, forest, and mineral resources, with special emphasis on economic aspects of alternative methods of resource utilization. *Preq:* APEC 2020 or ECON 2000 or ECON 2110.
- APEC 3610 Introduction to Health Care Economics 3 (3)** Introductory course in which students learn the basic economics of the institutions comprising the health-care industry. Topics include the underlying supply, demand, and institutional factors impacting health-care availability and cost of health care. May also be offered as HLTH 3610.
- APEC 4020\* Production Economics 3 (3)** Economic analysis of agricultural production involving the concept of the farm as a firm; principles for decision making; the quantitative nature and use of production and cost functions and the interrelations and applications of these principles to resource allocation in farms and among areas. *Preq:* APEC 3080; and ECON 3060 or ECON 3140.
- APEC 4080 Quantitative Applied Economics 3 (3)** Regression analysis, linear programming, and risk efficiency analysis techniques are presented and applied to agribusiness firms to improve firm economic efficiency. Microcomputer optimization and statistical software packages are utilized to develop firm level strategic plan to achieve efficient agribusiness outcomes in uncertain economic environments. *Preq:* STAT 2300.
- APEC 4090\* Commodity Futures Markets 3 (3)** Introduction to the economic theory, organization, and operating principles of agricultural commodity futures markets in the United States. Emphasizes speculating, hedging, and investing in agricultural commodity futures contracts from the standpoint of the agribusiness entrepreneur. *Preq:* APEC 2020 or ECON 2110.
- APEC 4110\* Regional Impact Analysis 3 (3)** Techniques for analysis of the growth and decline of regions, including economic-base theory, shift share, regional input-output, regional econometric models, and fixed impact models. *Preq:* APEC 2020; or both ECON 2110 and ECON 2120.
- APEC 4120\* Regional Economic Development Theory and Policy 3 (3)** Development of rural economic activity in the context of historical, theoretical, and policy aspects of friction associated with spatial separation. Considers location factors, transfer costs, location patterns, and regional-growth policy. *Preq:* APEC 2020 or ECON 2110.
- APEC 4130\* Advanced Real Estate Appraisal 3 (3)** Topics include highest and best use analysis, data collection, and analyses. Stresses advanced appraisal procedures for income, cost, and comparable sales approach to real estate valuation. Covers eminent domain, the appraisal of property in transition, and specialized property. *Preq:* APEC 3130 or FIN 3070.
- APEC 4210\* Globalization 3 (3)** Utilizes basic principles of international economics (comparative advantage, free trade versus protectionism, exchange rate determination, etc.) to analyze the contemporary problems and issues of the world economy. Emphasizes application of economic principles to current globalization trends. *Preq:* APEC 2020 or ECON 2000 or ECON 2110.
- APEC 4260\* Cropping Systems Analysis 3 (2)** Application of agronomic and economic principles in solving problems related to the production and marketing of agronomic crops. Major part of the course is a case study in which detailed analysis of a farm, agribusiness, or environmental situation is made with students making formal written and oral presentations of results. May also be offered as PES 4260. *Preq:* PES 1040; and Junior standing; and APEC 2020 or ECON 2000 or ECON 2110. *Coreq:* APEC 4261.
- APEC 4261\* Cropping Systems Analysis Laboratory 0 (2)** Non-credit laboratory to accompany APEC 4260. *Coreq:* APEC 4260. May also be offered as PES 4261.
- APEC 4520\* Agricultural Policy 3 (3)** Review of public agricultural policy programs in the United States and a critical examination of current and proposed government policies and programs affecting the agricultural sector of the economy. Includes economic considerations as related to past and current farm price and income problems. Includes Honors sections. *Preq:* APEC 2020 or ECON 2000 or ECON 2110.
- APEC 4560\* Prices 3 (3)** Review of the basic theory of price under competitive conditions and various modifications; nature, measurement, and causes of daily, seasonal, and cyclical price fluctuations; geographical price relationships; nature, function, and behavior of futures markets; government price programs. Includes Honors sections. *Preq:* APEC 3080 or ECON 4050; and ECON 3060 or ECON 3140.
- APEC 4570\* Natural Resource Use, Technology, and Policy 3 (3)** Focuses on economic analyses of actual, efficient, and sustainable uses of natural resources; impacts of technologies that affect these uses, and policies that affect development and use of such technologies. Resource-technology-policy combinations may vary, but an example is crude oil, hybrid automotive engines, and fuel economy standards. May also be offered as ECON 4570. *Preq:* MATH 1020 or MATH 1060; and APEC 3570 or ECON 3140.
- APEC 4600\* Agricultural Finance 3 (3)** Study of the principles and technique of financing in the agricultural sector. Topics include the capital situation in agriculture, concepts of farm financial management, use of credit, capital markets, lending agencies, and estate planning. *Preq:* ACCT 2010; and APEC 2020 or ECON 2000 or ECON 2110.
- APEC 4750\* Economics of Wildlife Management and Policy 3 (3)** Integrated approach to the study of the economics of wildlife. Topics include determination of market and nonmarket value, single and multiple species management, enterprise cost and returns, marketing wildlife, leasing methods, complementarity and competitiveness with agricultural and forestry enterprises, and timber and crop damage cost estimates and control. *Preq:* APEC 2020 or ECON 2000 or ECON 2110 or FOR 3040 or WFB 3060.
- APEC 4900 Selected Topics 1-15 (1-15)** Study of topics in applied economics. Topics may include classroom and/or field experience not normally covered in other classes. May be repeated for credit, but only if different topics are covered. *Preq:* Junior standing.
- APEC 4910 Internship, Agribusiness, and Community and Rural Development 1-6 (1-6)** Internship under faculty supervision in an approved agency or firm. Internships provide students with work experience in agribusiness or community and rural development. Students submit a comprehensive report within one week of the end of the internship. A maximum of six internship credits may be earned. *Preq:* Junior standing and consent of instructor.
- APEC 4940 Creative Inquiry—Community and Rural Development 1-3 (1-3)** Multi-semester commitment to participate in agricultural and applied economics and community and economic development related research experience for students working in teams, mentored and directed by a faculty member. Students learn to collect, analyze, evaluate, and present information. Suitable for inclusion in the students e-portfolio. May be repeated for a maximum of 12 credits. *Preq:* Consent of instructor.

## ARABIC

- ARAB 1000 Introduction to Arabic Conversation and Comprehension 3 (3)** Introduction to the Arabic language and its different dialects and cultures. Also prepares students who wish to travel to Arabic speaking countries.
- ARAB 1010 Elementary Arabic I 4 (3)** Introductory course for beginners emphasizing acquisition of the Arabic alphabet and writing, basic grammar, vocabulary, speaking and listening skills, and developing strategies for the successful long-term acquisition of Arabic. *Coreq:* ARAB 1011.
- ARAB 1011 Elementary Arabic I Laboratory 0 (1)** Non-credit laboratory to accompany ARAB 1010. *Coreq:* ARAB 1010.
- ARAB 1020 Elementary Arabic II 4 (3)** Continuation of ARAB 1010 consisting of three hours a week of classroom instruction and one hour a week in the language laboratory. *Preq:* ARAB 1010. *Coreq:* ARAB 1021.
- ARAB 1021 Elementary Arabic II Laboratory 0 (1)** Non-credit laboratory to accompany ARAB 1020. *Coreq:* ARAB 1020.
- ARAB 2010 Intermediate Arabic I 3 (3)** Continuation of ARAB 1020, emphasizing grammar, vocabulary, writing, reading, and acquisition of intermediate language skills. *Preq:* ARAB 1020. *Coreq:* ARAB 2011.
- ARAB 2011 Intermediate Arabic I Laboratory 0 (1)** Non-credit laboratory to accompany ARAB 2010. *Coreq:* ARAB 2010.
- ARAB 2020 Intermediate Arabic II 3 (3)** Continuation of ARAB 2010, emphasizing grammar, vocabulary, writing, reading, and acquisition of advanced intermediate language skills. *Preq:* ARAB 2010. *Coreq:* ARAB 2021.
- ARAB 2021 Intermediate Arabic II Laboratory 0 (1)** Non-credit laboratory to accompany ARAB 2020. *Coreq:* ARAB 2020.

**ARCHITECTURE**

*Professors:* D.J. Allison, J.F. Barker, *President Emeriti;* K.E. Green, R.J. Hogan, *Associate Chair;* K.L. Schwennsen, *Chair;* S.F. Verderber, *Associate Professors:* D.G. Battisto, D.N. Harding, D.A. Hecker, R.T. Silance; *Assistant Professors:* D.G. Albright, C.R. Barrios Hernandez, V.Y. Blouin, U. Ersoy, S.R. Hambright-Belue, U. Heine, R.T. Huff (*Charleston*), P.L. Laurence, D.M. Lee, A.E. Montilla, M.L. Skinner; *Senior Lecturers:* R.A. Bruhns, A.H. Jacques, C.B. Mills; *Lecturers:* N. W. Ault, J.B. Garland, P.W. Head (*Charleston*), A.K. Jennings (*Charleston*), J.A. Lindsey (*Charleston*), D.A. Pastre (*Charleston*), J.G. Thomas (*Charleston*)

**ARCH 1010 Introduction to Architecture 3 (3)**

Introduction to the discipline and profession of architecture. Lectures and discussion cover a broad range of architectural issues throughout history. Emphasizes the relationship between architecture and other disciplines as well as across cultures. Includes the development of individual digital portfolio.

**ARCH 1510 Architecture Communication 5 (2)**

Introduction to principles and elementary vocabulary of architectural design. Collaborative studio which offers instruction in the specific skills of formal design composition, visual communication, oral presentation, and computer literacy. *Preq:* ARCH 1010. *Coreq:* ARCH 1511.

**ARCH 1511 Architecture Communication Laboratory 0 (6)**

Non-credit laboratory to accompany ARCH 1510. *Coreq:* ARCH 1510.

**ARCH 1520 Collaborative Studio II 3 (1)**

Continuation of ARCH 1510. Introduction to an elemental vocabulary of architecture within basic spatial design problems, emphasizing visual communications skills, oral presentations of work, and analysis and discussion of design issues through critical readings of canonical texts and buildings. *Preq:* ARCH 1510. *Coreq:* ARCH 1521.

**ARCH 1521 Collaborative Studio II Laboratory 0 (6)**

Non-credit laboratory to accompany ARCH 1520. *Coreq:* ARCH 1520.

**ARCH 2040 History of Modern Architecture 3 (3)**

Survey of the modern period featuring special topics in the history of architecture. Emphasis is on typologies, historical antecedents and European precedents which give shape to buildings in the period of study. Key aspects of architectural theory and practice will be highlighted. *Preq:* AAH 1020.

**ARCH 2510 Architecture Foundations I 6 (2)**

Architectural analysis and design problems with a focus on understanding the context of architecture. Specific investigation of buildings as part of the cityscape and the landscape. Instruction on visual communications skills, computer modeling, and oral presentation techniques support the design discussions. *Preq:* ARCH 1510. *Coreq:* ARCH 2511.

**ARCH 2511 Architecture Foundations I Laboratory 0 (10)**

Non-credit laboratory to accompany ARCH 2510. *Coreq:* ARCH 2510.

**ARCH 2520 Architecture Foundations II 6 (2)**

Continuation of ARCH 2510. Architectural design problems with a focus on structural and construction principles and their relationship to contextual situations. Instruction in oral communication skills and computer graphics support the design discussions. *Preq:* ARCH 2510. *Coreq:* ARCH 2521.

**ARCH 2521 Architecture Foundations II Laboratory 0 (10)**

Non-credit laboratory to accompany ARCH 2520. *Coreq:* ARCH 2520.

**ARCH 2700 Structures I 3 (3)**

The study of statically determinate structural elements and systems including load tracing through physical modeling and theoretical and analytical analysis, the interrelationship between stress and strain, stability and the implication of tension, compression, shear torsion and bending. *Preq:* PHYS 2070 and PHYS 2090.

**ARCH 2710 Structures II 3 (3)**

The study of force distributions and behavior in building structures constructed of reinforced concrete, steel and wood. Exploration of typical building components including beams, slabs, columns and foundations and how they are used in high-rise and long span structural design. *Preq:* ARCH 2700 or CSM 2010.

**ARCH 3510 Studio Clemson 6 (1)**

Addresses architectural problems with varied scales, programs, and locations. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 18 credits. *Preq:* ARCH 2520. *Coreq:* ARCH 3511.

**ARCH 3511 Studio Clemson Laboratory 0 (11)**

Non-credit laboratory to accompany ARCH 3510. *Coreq:* ARCH 3510.

**ARCH 3520 Studio Charleston 6 (1)**

Addresses architectural problems with varied scales and programs in the context of Charleston, South Carolina. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 12 credits. *Preq:* ARCH 2520. *Coreq:* ARCH 3521.

**ARCH 3521 Studio Charleston Laboratory 0 (11)**

Non-credit laboratory to accompany ARCH 3520. *Coreq:* ARCH 3520.

**ARCH 3530 Studio Genoa 6 (1)**

Addresses architectural problems with varied scales and programs in the context of Genoa, Italy, and historic Europe. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Design problems vary every semester according to current issues. Continued development of graphic and oral communication skills. May be repeated for a maximum of 12 credits. *Preq:* ARCH 2520. *Coreq:* ARCH 3531.

**ARCH 3531 Studio Genoa Laboratory 0 (11)**

Non-credit laboratory to accompany ARCH 3530. *Coreq:* ARCH 3530.

**ARCH 3540 Studio Barcelona 6 (1)**

Addresses architectural problems with varied scales and programs in the context of Barcelona, Spain. Emphasizes the relationship between architecture and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of 12 credits. *Preq:* ARCH 2520. *Coreq:* ARCH 3541.

**ARCH 3541 Studio Barcelona Laboratory 0 (11)**

Non-credit laboratory to accompany ARCH 3540. *Coreq:* ARCH 3540.

**ARCH 3550 Studio South 6 (1)**

Addresses architectural problems with varied scales and programs in the context of the South. Emphasizes the relationship between architecture, community, and context. Projects include analysis, conceptual development, and architectonic resolutions. Continued development of graphic and oral communication skills. Design problems vary every semester according to current issues. May be repeated for a maximum of twelve credits. *Preq:* ARCH 2520. *Coreq:* ARCH 3551.

**ARCH 3551 Studio South Laboratory 0 (11)**

Non-credit laboratory to accompany ARCH 3550. *Coreq:* ARCH 3550.

**ARCH 4010 Architectural Portfolio 3 (3)**

Continues portfolio development for Architecture students, including professional portfolio, academic portfolio, and digital portfolio. *Preq:* ARCH 2520.

**ARCH 4030 The Modern Architectural Movement 3 (3)**

Seminar in the analysis and criticism of architectural and town building works. Course sequence includes historic and contemporary examples, literary searches, field trips, essays, and oral reports. *Preq:* Senior standing.

**ARCH 4040 Current Directions in Architecture 3 (3)**

Critical analysis of the development and current directions of modern movements in architecture. *Preq:* Senior standing.

**ARCH 4050\* American Architectural Styles 1650-1950 3 (3)**

Survey of American architectural styles and of the architects responsible for them, from the Colonial period to our recent past. Considerable emphasis is placed on identifying those architectural elements which serve as clues in determining a building's architectural style.

**ARCH 4120\* Architectural History Research 3 (3)**

Directed investigations related to the art and architectural history of Europe. May be repeated for a maximum of six credits. *Preq:* Junior standing.

**ARCH 4140\* Design Seminar 3 (3)**

Exploration of topical issues in architecture, art, construction, and planning. May be repeated for a maximum of six credits. *Preq:* Junior standing.

**ARCH 4160\* Field Studies in Architecture and Related Arts 3 (3)**

Documentation and analysis of architectural structures observed during European travels in graphic and written form. May be repeated for a maximum of six credits. *Preq:* Junior standing.

**ARCH 4210 Architectural Seminar 3 (3)**

Lectures and seminars dealing with pertinent topics related to environmental and technological considerations in architecture and the building industry. *Preq:* Senior standing.

**ARCH 4240\* Product Design 3 (9)**

Furniture and product system design with emphasis on ergonomics and the relationship of form and materials. *Preq:* Senior standing.

**ARCH 4250\* Energy in Architecture 3 (3)**

Climate design methodology and its influence on building energy patterns and architectural form. *Preq:* Senior standing and consent of instructor.

- ARCH 4260\* Architectural Color Graphics 3 (3)** Architectural color graphics by computer. Theories of color classification and interaction; application of color theories to art and architecture. *Preq:* Consent of instructor.
- ARCH 4270\* Advanced Color Graphics 3 (3)** Theories of color classification and interaction; three-dimensional color modeling by computer; advanced application of color theories to art and architecture. *Preq:* ARCH 4260.
- ARCH 4280\* Computer-Aided Design 3 (2)** Introduction to the concepts, skills, and applications of computer-aided design as they relate to the practice of architecture. *Preq:* Senior standing. *Coreq:* ARCH 4281.
- ARCH 4281\* Computer-Aided Design Laboratory 0 (3)** Non-credit laboratory to accompany ARCH 4280. *Coreq:* ARCH 4280.
- ARCH 4290\* Architectural Graphics 3 (3)** Provides students with an understanding of the concepts, skills, techniques, and strategies of visual presentation/graphics as they relate to the design professions - architects/landscape architects. *Preq:* Junior standing.
- ARCH 4300\* Theories and Philosophies of Technology and Architecture 3 (3)** Theoretical and practical examination of technology and architecture from pre-modern and modern viewpoints to study its nonneutral role in shaping and reflecting knowledge, beliefs, and actions within a cultural context.
- ARCH 4400\* New York Field Study 3 (3)** Study of architecture, art, planning, and urban design of New York. Two weeks of residence are required with scheduled field trips to relevant sites in all five boroughs, with counseling to determine research interests. Guidance is provided to resources in the city. A final report is required. Offered in the summer only.
- ARCH 4510 Architecture Studio III 6 (11)** Continuation of ARCH 3520. Advanced architectural issues of program and theory, synthesis of ideas, and self-criticism. *Preq:* ARCH 3520.
- ARCH 4520 Synthesis Studio 6 (1)** Integrates acquired skills, abilities, and interests from previous architecture studios. Projects emphasize the accumulation of architectural experiences and knowledge. *Preq:* Senior standing. *Coreq:* ARCH 4521.
- ARCH 4521 Synthesis Studio Laboratory 0 (11)** Non-credit laboratory to accompany ARCH 4520. *Coreq:* ARCH 4520.
- ARCH 4710 Architectural History of Place 3 (3)** Survey of urban design and architectural history using examples viewed in a particular locale. Emphasizes an overview survey of design movements identifying specific design elements and understanding how they are used in shaping place. Course is offered only during the summer at study abroad locations. *Preq:* ARCH 1010.
- ARCH 4720 Architectural Field Studies 3 (1)** Students develop diagramming and writing skills and use them to document and analyze existing works of urban design and architecture observed during field trips. Course is only offered during the summer at study abroad locations. *Preq:* ARCH 1010. *Coreq:* ARCH 4721.
- ARCH 4721 Architectural Field Studies Laboratory 0 (6)** Non-credit laboratory to accompany ARCH 4720. *Coreq:* ARCH 4720.
- ARCH 4770\* Introduction of Craft 1-3 (1-3)** Architectural craft lab offered under different material specializations, all of which introduce students to design as informed by craft through a hands-on lab. Basic craft operations and material properties are introduced for the subject material (wood, steel, etc.) May be repeated for a maximum of six credits.
- ARCH 4850\* History and Theory of Architecture + Health 3 (3)** Introduces relationships between health and architectural settings for health. Examines connections between cultural context, medical thought, health-care delivery, and health facility design within different time periods. Introduces contemporary theories on the relationships between human beings, their health and well-being, and the design of the physical environment. *Preq:* Consent of instructor.
- ARCH 4880\* Architectural Programming and Predisign 3 (3)** Introduces the theory, mechanics, and practice of architectural programming and post-occupancy evaluation. Presents programming as a means to create architectural settings sensitive to the needs of their inhabitants. Emphasizes collaborative methodologies that involve identifying relevant goals, facts, issues, needs, and concepts. Students develop an architectural program. *Preq:* Consent of instructor.
- ARCH 4890 Internship 1-6 (1-6)** Practicum in professional practice. Paid work/study in a variety of related disciplines provides students with hands-on experience in design and fabrication fields relevant to the environmental design professions. Consists of two parts: a professional component, managed by an approved sponsor, and an academic component, taught by the instructor. May be repeated for a maximum of 18 credits. *Preq:* Consent of instructor and acceptance by sponsor.
- ARCH 4900 Directed Studies 1-5 (1-5)** Comprehensive studies and research of special topics not covered in other courses. Emphasis is on field studies, research activities, and current developments in architecture. May be repeated for a maximum of ten credits. Includes Honors sections. *Preq:* Consent of department chair.
- ARCH 4990\* Selected Topics in Architecture 1-3 (1-3)** Study of selected topics in architecture. May be repeated for a maximum of nine credits, but only if different topics are covered. Includes Honors sections. *Preq:* Junior standing.
- ART**  
*Professors:* S.A. Cross, D.M. Detrich, W.W. Lew, M.V. Vatalaro, *Chair; Associate Professors:* A.V. Feeser, J.B. LeBlanc, H.J. Jensen; *Assistant Professors:* D. Donar, C.N. Hung, T. McDonald, A. Wrangle; *Lecturers:* S. Grier, L. House, J.R. Manson, A. Plotek, D.C. Woodward-Detrich
- ART 1030 Visual Arts Studio 3 (6)** Studio projects in basic visual elements and principles. The development of creative design process, visual organization, and design skills are introduced as a foundation for further study in visual arts.
- ART 1050 Foundation Drawing I 3 (3)** Introduction to drawing. Presents exploration of observational drawing practices with an emphasis on structural investigations of form and application of spatial systems. Basic materials and approaches associated with drawing are studied and applied. *Preq:* Visual Arts major.
- ART 1060 Foundation Drawing II 3 (3)** Further exploration of introductory drawing. Emphasizes use of tone and color. Students work primarily with representational categories, developing comprehension of complex forms and spaces in relation to the 2-D planes. Includes use of rigorous observational drawing practices in conjunction with thematic efforts. *Preq:* ART 1050 or ART 1510.
- ART 1510 Foundations in Visual Art I 3 (6)** Intensive introduction to the fundamentals of visual art. Studio projects, lectures, and discussions introduce topics and projects relative to foundation-level art students. Explores historical and contemporary applications of the elements and principles of design. *Preq:* Visual Arts major.
- ART 1520 Foundations in Visual Art II 3 (6)** Intensive introduction to the fundamentals of visual art. Studio projects, lectures, and discussions introduce topics and projects relative to foundation-level art students. Explores historical and contemporary applications of the elements and principles of design. *Preq:* Visual Arts major.
- ART 1530 Orientation to Visual Arts I 1 (1)** Introduction to the visual arts profession focusing on issues related to various career opportunities, creativity, problem-solving methodologies, and current thinking in contemporary art. *Preq:* Visual Arts major.
- ART 2050 Beginning Life Drawing 3 (6)** Primary emphasis is on drawing from the live model. Students' drawing skills and fundamental understanding of the structure and form of the human figure are reviewed through studio practice, augmented by lectures, discussions, demonstrations, and critiques. Addresses historical and contemporary use of the human figure in visual arts. *Preq:* ART 1060 or ART 1510 or ART 1520.
- ART 2070 Beginning Painting 3 (6)** Introduction to basic materials, methods, and techniques of painting. Primary medium used is acrylic, and other painting media may also be introduced. Emphasizes basic skills in painting plus individual creative development. *Preq:* ART 1510 and ART 1530 and ART 2050 (Visual Arts majors); ART 1030 (non-Art Majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).
- ART 2090 Beginning Sculpture 3 (6)** Studio course investigating the meaning of sculpture through traditional and nontraditional approaches. Establishes a working knowledge of material and process in several media. Personal expression is encouraged and enhanced by employment of problem-solving techniques. Static, temporal, installation, and site specific sculpture is explored. *Preq:* ART 1510 and ART 1520 and ART 1530 and ART 1540 and ART 2050 (Visual Arts majors); ART 1030 (non-Art majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).



- ART 2110 Beginning Printmaking 3 (6)** Studio course introducing basic techniques of relief printing, intaglio, lithography, silkscreen, and papermaking. Each semester concentrates on two or three of these techniques. Coursework integrates print-making processes and creativity. *Preq:* ART 1510 and ART 1520 and ART 1530 and ART 1540 and ART 2050 (Visual Arts majors); ART 1030 (non-Art majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).
- ART 2130 Beginning Photography 3 (6)** Introduction to the use of photography as an art medium. Lectures and studio work cover the utilization of the camera, processing, and printing in black and white, with emphasis on perception and creative expression. *Preq:* ART 1510 and ART 1520 and ART 1530 and ART 1540 and ART 2050 (Visual Arts majors); ART 1030 (non-Art majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).
- ART 2150 Beginning Graphic Design 3 (6)** Introduction to fundamental techniques, concepts, and principles of visual communication. Through a series of projects and studio work, students explore techniques of communication through the use of type design, typography, photography, illustration, symbolism, and product design. Individual creative development is stressed. *Preq:* ART 1510 and ART 1520 and ART 1530 and ART 1540 and ART 2050 (Visual Arts majors); ART 1030 (non-Art majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).
- ART 2170 Beginning Ceramics 3 (6)** Basic studio course introducing ceramic arts through its various processes and techniques. Hand building methods as well as throwing on the potter's wheel are developed. Weekly projects emphasize imagination, self-expression, and skill development. Ceramic history is introduced through slide lectures. *Preq:* ART 1510 and ART 1520 and ART 1530 and ART 1540 and ART 2050 (Visual Arts majors); ART 1030 (non-Art majors); ARCH 1520 (Architecture majors); LARC 1520 (Landscape Architecture majors).
- ART 2210 Beginning New Media 3 (6)** Explores new media art practices and ideas. Digital tools and processes are explored relative to drawing, painting, printing, bookmaking, and photography. Introduces new media as a context of new collective, interactive, and social modes of art production. *Preq:* ART 1060 and ART 1510 and ART 1520.
- ART 2230 Woodworking Studio 3 (6)** Introduces woodworking explorations in sculpture and furniture design emphasizing technical understanding and creative application of woodworking processes and methodologies. Students experiment with wood as a vehicle for personal expression and thematic development and conduct research on the historical impact of woodworking in the visual arts. *Preq:* ART 1510; and one of ART 1520 or ARCH 1520 or LARC 1520.
- ART 3050 Intermediate Drawing 3 (6)** Presents drawing problems and processes directed toward the production of thematically driven projects. Exploration of diverse drawing media. Emphasizes further development of drawing skills, relationships of materials/techniques to subject matter, and the study of contemporary issues in drawing. *Preq:* ART 2050.
- ART 3070 Painting 3 (6)** Continuation of ART 2070 with increased emphasis on personal expression and growth in technical competence. Some study of painting history is included in studio activity. *Preq:* ART 2070.
- ART 3090 Sculpture 3 (6)** Continuation of ART 2090 with increased emphasis on personal expression and content of work. Further exploration of materials and processes, including an introduction to foundry casting and advanced welding techniques. Individual investigation into current and historical aspects of sculpture is required. *Preq:* ART 2090.
- ART 3110 Printmaking 3 (6)** Continuation of processes in beginning printmaking emphasizing expanding the range and depth of technique. The relationship of technique and process to creative idea development is emphasized. *Preq:* ART 2110.
- ART 3120 Printmaking Research I 1-3 (1-3)** Continuation of ART 3110. Technical and conceptual research in printmaking to develop self-expression. Special projects are constructed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 3110.
- ART 3130 Photography 3 (6)** Continuation of ART 2130. Advanced techniques and more diverse types of film and paper are used in making images of personal and expressive nature. The design and construction of a view camera, printing in color, and multiple imagery may also be included. *Preq:* ART 2130.
- ART 3150 Graphic Design 3 (6)** Continuation of concepts and techniques introduced in ART 2150 with emphasis on more applied projects. Individual creative solutions are emphasized. *Preq:* ART 2150.
- ART 3170 Ceramic Arts 3 (6)** Continuation of skill development leading to more challenging projects and independent efforts. Further exposure to ceramic history and ceramic technology is presented. *Preq:* ART 2170.
- ART 3180 Ceramics Research I 1-3 (1-3)** Continuation of ART 3170. Technical and conceptual research in ceramics for the purpose of self-expression. Projects are constructed in consultation with instructor. May be repeated for a maximum of five credits. *Preq:* ART 3170.
- ART 3210 New Media Art II 3 (6)** Intermediate-level course that introduces students to time-based art practices such as video art, installation, and performance art forms. Through regularly scheduled studio projects, readings, and screenings, students develop video, installation, and motion graphic techniques, and receive a historical overview of time-based art practices. *Preq:* ART 2210.
- ART 3230 Digital Sculpture 3 (6)** Studio course covering digital processes applied to making sculpture. Explores digital media as a resource for creative development, creating digital renderings of sculptures, and the fabrication of models and sculptures using CNC technology. *Preq:* ART 2090 and ART 3210.
- ART 3550 Atelier InSite Creative Inquiry I 3 (6)** An in-depth examination and research of Site Specific Public Art as it currently exists. Course provides critically considered and appropriate artwork for new building projects on the Clemson University campus. Open to students from a wide variety of programs who are interested in this interdisciplinary collaborative endeavor.
- ART 3750 Writing for the Arts in Charleston 3-6 (3-6)** Using Charleston's international Spoleto Festival USA as a laboratory, students engage in interdisciplinary, critical readings and observations of multiple elements of performing and visual arts programs, and write extensively about their place in a global, contemporary society. Students develop professional and technological literacies using print and digital media. Offered summer only. May be repeated for a maximum of six credits. *Preq:* ENGL 1030.
- ART 4050\* Advanced Drawing 3 (6)** Advanced level studies of drawing which explore the synthesis of refined drawing skills and philosophies of art. Students' understanding of drawing as a form of art is developed through studio practice augmented by critiques, demonstrations, lectures, field trips, and independent research. *Preq:* ART 3050.
- ART 4070\* Advanced Painting 3 (6)** Advanced studio course in painting. Students select painting media and develop a strong direction based on prior painting experience. Includes study of contemporary painters and directions. *Preq:* ART 3070.
- ART 4090\* Advanced Sculpture 3 (6)** Intensive independent studio concentration to further develop personal direction and content. Emphasizes continued investigation of sculptural context, materials and processes, and relative historical research. *Preq:* ART 3090.
- ART 4110\* Advanced Printmaking 3 (6)** Culmination of process, techniques, and individual development. Students are expected to have mastered process and technique for the benefit of the image produced. Creativity and self-expression are highly emphasized as students select a process for concentrated study. *Preq:* ART 3110.
- ART 4130\* Advanced Photography 3 (6)** Continuation of ART 3130. Advanced problems in photography. *Preq:* ART 3130.
- ART 4150 Advanced Graphic Design 3 (6)** Continuation of ART 3150. Personal expression through communication techniques is further explored. Individual projects are emphasized. *Preq:* ART 3150.
- ART 4160 Advanced Media Art: Interactive Objects and Environments 3 (6)** Students apply advanced media art production skills to create objects and environments that respond to user input or interaction. Tools used may include, but are not limited to, microcontrollers, sensors, RFID systems and electronic circuits, as well as traditional input devices. *Preq:* ART 3210.
- ART 4170\* Advanced Ceramic Arts 3 (6)** Students are directed toward further development of ideas and skills. Glaze calculation and firing processes are incorporated to allow for a dynamic integration of form and ideas. *Preq:* ART 3170.
- ART 4200\* Selected Topics in Art 1-3 (1-3)** Intense course in studio art. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing.
- ART 4210 Two-Dimensional Digital Animation 3 (6)** Exposes students to the principles of animation with traditional techniques, while incorporating the latest 2-D digital tools. Students also develop interactive animations and showcase their work via the Internet. *Preq:* ART 3210.

**ART 4550 Atelier InSite Creative Inquiry II 3 (6)** An in-depth examination and research of Site Specific Public Art as it currently exists. Course provides critically considered and appropriate artwork for new building projects on the Clemson University campus. Continuation of ART 3550. Open to students from a wide variety of programs who are interested in this interdisciplinary collaborative endeavor. *Preq:* ART 3550.

**ART 4710 Bachelor of Fine Arts Senior Studio I 3 (6)** Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Focuses on a particular studio area, concept, or theme. May be repeated for a maximum of six credits. *Preq:* Senior standing and completion of 3000/400 sequence in the chosen studio area, minimum grade-point average of 3.0 in focus studio area, participation in senior studio interview. *Coreq:* ART 4730.

**ART 4720 Bachelor of Fine Arts Senior Studio II 5 (15)** Individual studio project directed by an instructor and determined by the student in consultation with the instructor. Usually focuses upon a particular studio area, concept, or theme. *Preq:* ART 4710 with a B or better.

**ART 4730 Senior Seminar in Professional Career Preparation 3 (3)** Seminar and practical guide to prepare students for entry into the professional art world. Focuses on issues concerning visual artists in the early years of their professional activities. Presents career options and practical information for the graduating senior, including portfolio development. *Coreq:* ART 4710.

**ART 4740 Travel Seminar I (1)** Students travel with faculty to museums, galleries and festivals that directly affect studio practice, art history knowledge and engagement in historical and contemporary art practice. Students plan trips, conduct research, keep a journal and make presentations on works and sites visited and matters pertaining to professional practice. To be taken Pass/No Pass only. May be repeated for a maximum of three credits. *Preq:* Junior standing.

**ART 4890 Art and Art History Internship 1-3 (1-3)** Internship with an approved sponsoring art institution in support of professional development and best art practices. May be repeated for a maximum of six credits. *Preq:* Junior standing in Visual Arts and consent of instructor and acceptance by sponsor.

**ART 4900\* Directed Studies 1-5 (1-5)** Study of areas in the visual arts not included in other courses or additional advanced work. Must be arranged with a specific instructor prior to registration. May be repeated for a maximum of 18 credits. Includes Honors sections. *Preq:* Consent of instructor.

## AEROSPACE STUDIES

*Professor:* J.G. Riemens-Van Laare, *Chair; Assistant Professors:* S.P. Jordan, S.D. Wiggins

**AS 1090 Air Force Today I 2 (1)** Deals with Air Force in the contemporary world through a study of the total force structure: strategic offensive and defensive, general purpose, and aerospace support. Leadership laboratory activities include drill fundamentals, customs, and courtesies of the service. *Coreq:* AS 1091.

**AS 1091 Air Force Today I Laboratory 0 (2)** Non-credit laboratory to accompany AS 1090. *Coreq:* AS 1090.

**AS 1100 Air Force Today II 2 (1)** Continuation of AS 1090. Leadership laboratory includes drill, ceremonies, and an introduction to Air Force career opportunities. *Coreq:* AS 1101.

**AS 1101 Air Force Today II Laboratory 0 (2)** Non-credit laboratory to accompany AS 1100. *Coreq:* AS 1100.

**AS 2090 Development of Air Power I 2 (1)** Study of the development of air power from balloons and dirigibles through the peaceful employment of U.S. air power in relief missions and civic action programs in the late 1960s and also the air war in Southeast Asia. Leadership laboratory provides experience in guiding, directing, and controlling an Air Force unit. *Coreq:* AS 2091.

**AS 2091 Development of Air Power I Laboratory 0 (2)** Non-credit laboratory to accompany AS 2090. *Coreq:* AS 2090.

**AS 2100 Development of Air Power II 2 (1)** Continuation of AS 2090. *Coreq:* AS 2101.

**AS 2101 Development of Air Power II Laboratory 0 (2)** Non-credit laboratory to accompany AS 2100. *Coreq:* AS 2100.

**AS 3090 Air Force Leadership and Management I 4 (3)** Emphasizes the individual as a manager. Individual motivational and behavioral processes, leadership, communication, and group dynamics are covered to provide a foundation for the development of the Air Force officer's professional skills. Students prepare individual and group presentations, write reports, participate in group discussions, seminars, and conferences. *Coreq:* AS 3091.

**AS 3091 Air Force Leadership and Management I Laboratory 0 (2)** Non-credit laboratory to accompany AS 3090. *Coreq:* AS 3090.

**AS 3100 Air Force Leadership and Management II 4 (3)** Continuation of AS 3090. Uses the basic managerial processes involving decision making, utilization of analytical aids in planning, organizing, and controlling environment. Actual case studies are used to enhance learning and communication processes. *Coreq:* AS 3101.

**AS 3101 Air Force Leadership and Management II Laboratory 0 (2)** Non-credit laboratory to accompany AS 3100. *Coreq:* AS 3100.

**AS 4090 National Security Policy I 4 (3)** Analysis of the role and function of the military officer in a democratic society and the relationships involved in civil-military interactions. Students prepare individual and group presentations, write reports, and participate in group discussions. *Coreq:* AS 4091.

**AS 4091 National Security Policy I Laboratory 0 (2)** Non-credit laboratory to accompany AS 4090. *Coreq:* AS 4090.

**AS 4100 National Security Policy II 4 (3)** Continuation of AS 4090. Examines the environmental context in which U.S. defense policy is formulated and implemented. Emphasizes initial commissioned service and military justice. Students prepare individual and group presentations for the class, write reports, and participate in group discussions, seminars, and conferences. *Coreq:* AS 4101.

**AS 4101 National Security Policy II Laboratory 0 (2)** Non-credit laboratory to accompany AS 4100. *Coreq:* AS 4100.

## AMERICAN SIGN LANGUAGE

*Associate Professor:* W.A. Brant; *Lecturer:* T. Bateson

**ASL 1010 American Sign Language I 4 (3)** Introduction to the basics of American Sign Language, its history, and culture. Visual-gestural communication techniques are used. *Coreq:* ASL 1011.

**ASL 1011 American Sign Language I Laboratory 0 (1)** Non-credit laboratory to accompany ASL 1010. *Coreq:* ASL 1010.

**ASL 1020 American Sign Language I 4 (3)** Continuation of ASL 1010 and culture to develop further communicative competencies. Proficiency oriented with the use of visual-gestural communication skills. *Preq:* ASL 1010. *Coreq:* ASL 1021.

**ASL 1021 American Sign Language I Laboratory 0 (1)** Non-credit laboratory to accompany ASL 1020. *Coreq:* ASL 1020.

**ASL 2010 American Sign Language II 3 (3)** Continuation of ASL 1020. Covers additional vocabulary, sentences, and grammar structures. Main focus is on conversational and receptive skills as well as a better understanding of Deaf culture. *Preq:* ASL 1020.

**ASL 2020 American Sign Language II 3 (3)** Continuation of ASL 2010, concentrating on intermediate conversational and discourse skills using American Sign Language, more complex American Sign Language grammar, reading comprehension, and composition of short stories, narratives, and dialogues with an emphasis on topics related to the Deaf community. Class is conducted totally in American Sign Language using visual-gestural communicative techniques. *Preq:* ASL 2010.

**ASL 2970 Creative Inquiry—American Sign Language 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. *Preq:* Consent of faculty member because arrangements with faculty member must be established prior to registration.

**ASL 3000 Fingerspelling and Numbers in American Sign Language 1 (1)** Advanced study of the manual alphabet (fingerspelling) and the numerical system in American Sign Language, with extensive practice in both expressive and receptive skills. *Preq:* ASL 2010.

**ASL 3010 Advanced American Sign Language I 3 (3)** Focuses on American Sign Language fluency, vocabulary development, grammatical structures of American Sign Language, use of classifiers, conversational skills, translating written texts into American Sign Language, and vice versa. Emphasis is on making formal presentations in American Sign Language. *Preq:* ASL 2020.

**ASL 3020 Advanced American Sign Language II 3 (3)** Continuation of ASL 3010. Focuses on American Sign Language fluency, vocabulary development, grammatical structures of American Sign Language, use of classifiers, conversational skills, translating written texts into American Sign Language, and vice versa. Emphasis is on making formal presentations in American Sign Language. *Preq:* ASL 3010.

**ASL 3040 Internship in American Sign Language** 3 (4) Minimum 60 contact hours in an environment exclusively using American Sign Language. Frequent opportunities to converse with native signers in classroom settings, dormitory settings, meals, excursions, sporting events, cultural events, and meetings. *Prq:* ASL 2020.

**ASL 3050 Deaf Studies in the United States** 3 (3) In-depth look into language, culture, and daily lives of approximately one million people who use American Sign Language as their primary language. Traces the roots of American Sign Language from pre-revolutionary times to current science and knowledge and how it applies to professional fields. *Prq:* ASL 2020.

**ASL 3150 Survey of Interpreting in Public Schools** 3 (3) Overview of the ASL/English interpreting profession in public schools. Includes discussions about the role, function, and aptitudes of educational interpreters, the bilingual and bicultural context, history of interpreting, principles of professional practice, laws that affect educational interpreting, and analysis of the impact of classroom variables on accessibility and interpretability. *Prq:* ASL 2010.

**ASL 3200 American Sign Language–English Interpreting in Elementary Schools I** 3 (3) ASL English interpreting in the elementary classroom. Includes analysis of the discursive features of elementary classrooms; translation of materials encountered in elementary classrooms; rendering of interpretations of elementary classroom discourse, both consecutively and simultaneously; and assessment of the effectiveness of interpreted products. *Prq:* ASL 3150.

**ASL 3250 American Sign Language–English Interpreting in Secondary Schools I** 3 (3) ASL English interpreting in the high school classroom. Includes analysis of the discursive features of several high school courses; translation of materials encountered in high school classrooms; rendering interpretations, both consecutively and simultaneously; and assessment of the effectiveness of interpreted products. *Prq:* ASL 3150.

**ASL 3450 American Sign Language for Health Care Practitioners I** 3 (3) Intermediate instruction of specific health care and medical terminology in American Sign Language. Topics relate to specific body systems, medical terminology, and cultural aspects that have a direct bearing on medical treatment and understanding the deaf patient. *Prq:* ASL 3020.

**ASL 3490 Advanced Applications in American Sign Language** 3 (3) Study of select signs in American Sign Language emphasizing culturally appropriate signs in education, psychology/mental health, legal/legislation, health/medicine, religion, drugs/alcohol, and technology. May be repeated for a maximum of six credits. *Prq:* ASL 2020.

**ASL 3970 Creative Inquiry–American Sign Language** 1-4 (1-4) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**ASL 4010 Discourse in American Sign Language I** 3 (3) Designed for advanced-level students in American Sign Language. Primary goal is to further develop students' understanding and knowledge of American Sign Language by incorporating in-depth analysis of American Sign Language's historical development, linguistic structures, syntax, grammar, and pragmatics. *Prq:* ASL 3020.

**ASL 4020 Discourse in American Sign Language II** 3 (3) Continuation of American Sign Language 4010. Primary goal is to further develop students' understanding and knowledge of American Sign Language by incorporating analysis of time concepts, variations due to region and ethnicity, pluralization, classifiers, locatives, temporal aspects, and pronoun usage in American Sign Language. *Prq:* ASL 4010.

**ASL 4200 American Sign Language–English Interpreting in Elementary Schools II** 3 (3) Continuation of ASL 3200. Further analyses of elementary school curricular discourse; rendering interpretations of elementary school classroom discourse simultaneously; preparation and interpretation or presentations from second language into first language; and assessment of the effectiveness of interpreted products. *Prq:* ASL 3200.

**ASL 4250 American Sign Language–English Interpreting in Secondary Schools II** 3 (3) Continuation of ASL 3250. Further analyses of high school curricular discourse; rendering interpretations of high school classroom discourse simultaneously; preparing and interpreting presentations from second language to first language; and assessment of the effectiveness of interpreted products. *Prq:* ASL 3250.

**ASL 4450 American Sign Language for Health Care Practitioners II** 3 (3) Continuation of ASL 3450. Expands health care and medical terminology in American Sign Language. Topics relate to specific body systems, ASL medical terminology, insurance, and medications. *Prq:* ASL 3450.

**ASL 4600 Deaf Literature and Folklore** 3 (3) Designed for advanced-level students in American Sign Language. Primary goal is to further develop students' knowledge and understanding of Deaf literature, folklore, and the community at large. Includes introductions to deaf authors, literary works, plays, poetry, painting, and sculpture. *Prq:* ASL 3020.

**ASL 4970 Creative Inquiry–American Sign Language** 1-4 (1-4) Continuation of research initiated in ASL 3970. Students complete their projects and disseminate their research results. *Prq:* ASL 3970.

**ASL 4980 Independent Study** 1-3 (1-3) Supervised research and study on topics related to the origins and growth of American Sign Language and the Deaf Community in the United States (1800–present). May be repeated for a maximum of six credits. *Prq:* ASL 2020.

## ASTRONOMY

*Professors:* D.H. Hartmann, M.D. Leising, B.S. Meyer; *Associate Professors:* P.J. Flower, J.R. King; *Assistant Professor:* S. Brittain

**ASTR 1010 Solar System Astronomy** 3 (3) Descriptive survey of the universe, with emphasis on basic physical concepts and the objects in our solar system. Related topics of current interest are included. For nonscience majors.

**ASTR 1020 Stellar Astronomy** 3 (3) Descriptive survey of the universe, with emphasis on basic physical concepts and galactic and extragalactic objects. Related topics of current interest are included. For nonscience majors. May not be taken by students who have completed ASTR 3020.

**ASTR 1030 Solar System Astronomy Laboratory** 1 (2) Optional laboratory to accompany ASTR 1010. Demonstrations, laboratory exercises, and planetarium visits supplement the lecture course. *Prq or concurrent enrollment:* ASTR 1010.

**ASTR 1040 Stellar Astronomy Laboratory** 1 (2) Optional laboratory to accompany ASTR 1020. Demonstrations, laboratory exercises, and planetarium visits supplement the lecture course. *Prq or concurrent enrollment:* ASTR 1020.

**ASTR 1050 Physics of the Universe** 3 (3) Basic physics principles of Newtonian mechanics, special and general relativity, quantum mechanics, atomic structure, thermal physics, optics, and radiation physics are qualitatively and quantitatively presented. These principles are then applied to demonstrate their usefulness in understanding fundamental astrophysical objects and processes in the cosmos. *Prq:* MATH 1050.

**ASTR 2200 Planetary Science** 3 (3) Survey of the formation and evolution of planetary bodies. Emphasizes the origin of planetary material and comparative study of the primary processes operative on planetary surfaces. Describes major features of the planets and moons in our solar system, as revealed by recent space missions. May also be offered as GEOL 2200.

**ASTR 3020 Stellar Astrophysics** 3 (3) Study of the basic physical concepts necessary for understanding the sun, other stars, and their evolution. Topics include star formation, stellar structure and evolution, binary stars, and observational techniques. *Prq:* PHYS 2210.

**ASTR 3030 Galactic Astrophysics** 3 (3) Study of basic physical concepts necessary for understanding the structure of the galaxy, the motions of the stars within it, the nature of the interstellar matter, other galaxies, the large-scale structure of the universe, and the origin of the solar system. *Prq:* PHYS 2210.

**ASTR 4750 Selected Topics in Astrophysics** 1-3 (1-3) Comprehensive study of an area of astrophysics. Topics may include nucleosynthesis and stellar evolution, extragalactic distance scale, structure and evolution of galaxies, and large-scale structure of the universe. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* ASTR 3020.

**AUDIO TECHNOLOGY**

Associate Professor: B.A. Whisler; Assistant Professor: H. Altstatt; Lecturer: K.W. Moore

**AUD 1850 Introduction to Audio Technology 3 (2)**  
Introduction to MIDI sequencing, analog and digital recording, digital processing and related audio production technologies. Not open to students who have taken MUSC 1800. *Preq:* Production Studies in Performing Arts major. *Coreq:* AUD 1851.

**AUD 1851 Introduction to Audio Technology Laboratory 0 (2)** Non-credit laboratory to accompany AUD 1850. *Coreq:* AUD 1850.

**AUD 1950 Creative Inquiry I 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**AUD 2790 Audio Practicum 3 (1)** Practical work in audio providing technical services to the broader university and surrounding community. Projects include recording live performances, sound support for public events, and audio support for film and animation projects. May be repeated for a maximum of six credits. *Preq:* AUD 3800 with a C or better. *Coreq:* AUD 2791.

**AUD 2791 Audio Practicum Laboratory 0 (5)**  
Non-credit laboratory to accompany AUD 2790. *Coreq:* AUD 2790.

**AUD 2800 Sound Reinforcement 3 (2)** Theory and practice of using audio equipment for amplifying sound in venues ranging from conference rooms to concert halls and sports arenas. *Preq:* Production Studies in Performing Arts major. *Coreq:* AUD 2801.

**AUD 2801 Sound Reinforcement Laboratory 0 (2)**  
Non-credit laboratory to accompany AUD 2800. *Coreq:* AUD 2800.

**AUD 2850 Acoustics of Music 3 (3)** Study of the relationship between the laws of physics and the production of music from an audio engineering perspective. Topics include mechanical and acoustical laws, harmonic analysis, musical scales, sound production in instruments, and the physiology of hearing. *Preq:* Production Studies in Performing Arts major.

**AUD 2950 Creative Inquiry II 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**AUD 3800 Audio Engineering I 3 (2)** Intermediate-level course in music technology focusing on digital hard-disk recording and acoustical considerations in audio engineering. *Preq:* PHYS 1220 with a C or better or PHYS 2070 with a C or better; and MUSC 1800 with a C or better or AUD 1850 with a C or better. *Coreq:* 3801.

**AUD 3801 Audio Engineering I Laboratory 0 (2)**  
Non-credit laboratory to accompany AUD 3800. *Coreq:* AUD 3800.

**AUD 3850 Advanced Live Sound Reinforcement 3 (2)** Advanced course in live sound reinforcement focused on digital consoles and sound system design. *Preq:* AUD 2800 with a C or better. *Coreq:* AUD 3851.

**AUD 3851 Advanced Live Sound Reinforcement Laboratory 0 (2)** Non-credit laboratory to accompany AUD 3850. *Coreq:* AUD 3850.

**AUD 3860 Electronic Composition and Sound Design 3 (2)** Intermediate- to advanced-level course covering techniques, methods and issues associated with electronic music composition and production. Topics include advanced MIDI/sequencing techniques, electronic orchestral arrangements, scoring/sound design, and picture and audio processing. *Preq:* AUD 1850 or MUSC 1800. *Coreq:* AUD 3861.

**AUD 3861 Electronic Composition and Sound Design Laboratory 0 (2)** Non-credit laboratory to accompany AUD 3860. *Coreq:* AUD 3860.

**AUD 3950 Creative Inquiry III 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**AUD 4800\* Audio Engineering II 3 (2)** Advanced course in music technology focused on music production integrating digital audio and virtual instruments. *Preq:* AUD 2850; and AUD 3800; and PHYS 2080 or PHYS 2210; each with a C or better. *Coreq:* AUD 4801.

**AUD 4801\* Audio Engineering II Laboratory 0 (2)**  
Non-credit laboratory to accompany AUD 4800. *Coreq:* AUD 4800.

**AUD 4850 Production Workshop 3 (2)** Project-based course focused on music production. Students produce an audio CD that includes recorded audio tracks and/or newly-created sequenced material with creative and appropriate packaging. *Preq:* AUD 4800 with a C or better. *Coreq:* AUD 4851.

**AUD 4851 Production Workshop Laboratory 0 (2)**  
Non-credit laboratory to accompany AUD 4850. *Coreq:* AUD 4850.

**AUD 4950 Creative Inquiry IV 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**AUD 4990\* Independent Study in Audio Technology 1-3 (1-3)** Tutorial work for students with special interests in audio study outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

**ANIMAL AND VETERINARY SCIENCES**

Professors: G.P. Birrenkott Jr., A.B. Bodine II; S.K. Duckett, A.K. Greene, T.C. Jenkins, D.V. Maurice, T.R. Scott, P.A. Skewes, J. Strickland, Chair; Associate Professors: M.A. Hall, S.L. Pratt; Assistant Professors: N. Long, K.L. Vernon; Instructors: B.G. Bolt, R. Miller, A.R. Shirley

**AVS 1000 Orientation to Animal and Veterinary Sciences 1 (2)** Study of the role of animal agriculture in the world today emphasizing supply and demand of end products and careers available in the animal industry.

**AVS 1500 Introduction to Animal Science 3 (3)**  
Survey of animal industries and their role in society. Examines the relationship between man and animals in both a current and historical context. *Coreq:* AVS 1510.

**AVS 1510 Introduction to Animal Science Laboratory 1 (2)** Examines the basic principles in the handling of livestock and techniques of farm animal production as well as orientation to animal production units. *Coreq:* AVS 1500.

**AVS 2000 Beef Cattle Techniques 2 (1)** Examines basic principles in the techniques and management associated with production of both beef cattle and sheep. Students may take only one techniques course per semester. *Preq* or *concurrent enrollment:* AVS 1500 and AVS 1510. *Coreq:* AVS 2001.

**AVS 2001 Beef Cattle Techniques Laboratory 0 (2)**  
Non-credit laboratory to accompany AVS 2000. *Coreq:* AVS 2000.

**AVS 2010 Poultry Techniques 2 (1)** Basic principles of the production of poultry are discussed and demonstrated. Students receive hands-on experience in the production and processing of poultry. Students may take only one techniques course per semester. *Preq:* AVS 1510. *Coreq:* AVS 2011.

**AVS 2011 Poultry Techniques Laboratory 0 (2)**  
Non-credit laboratory to accompany AVS 2010. *Coreq:* AVS 2010.

**AVS 2030 Dairy Science Techniques 2 (1)**  
Introduction to dairy production and processing. Laboratories include hands-on opportunities for management of dairy cattle, quality control of milk, and processing of milk and dairy products. Students may take only one techniques course per semester. *Preq:* AVS 1510. *Coreq:* AVS 2031.

**AVS 2031 Dairy Science Techniques Laboratory 0 (2)**  
Non-credit laboratory to accompany AVS 2030. *Coreq:* AVS 2030.

**AVS 2040 Horse Care Techniques 2 (1)** Basic principles of equine behavior, handling, and management are discussed and demonstrated. Students receive hands-on experience with various management techniques, including handling and all aspects of health care. Students may take only one techniques course per semester. *Preq:* AVS 1510. *Coreq:* AVS 2041.

**AVS 2041 Horse Care Techniques Laboratory 0 (2)**  
Non-credit laboratory to accompany AVS 2040. *Coreq:* AVS 2040.

- AVS 2050 Horsemanship Techniques 2** (4) Develops basic to advanced skills based on rider aptitude. Students learn the mechanics of safety, lungeing, basic position, cues, and rider's aids, as well as individual work and building subtlety and finesse with aids. *Preq:* AVS 1510.
- AVS 2060 Swine Techniques 2** (1) Examines the basic principles in the techniques and management associated with production of swine. Students may take only one techniques course per semester. *Preq:* AVS 1500 and AVS 1510. *Coreq:* AVS 2061.
- AVS 2061 Swine Techniques Laboratory 0** (2) Non-credit laboratory to accompany AVS 2060. *Coreq:* AVS 2060.
- AVS 2080 Techniques of Teaching Horsemanship 3** (2) Discusses teaching techniques and theory and handling of large mounted groups. Trains beginner through advanced levels. *Preq:* AVS 2050. *Coreq:* AVS 2081.
- AVS 2081 Techniques of Teaching Horsemanship Laboratory 0** (2) Non-credit laboratory to accompany AVS 2080. *Coreq:* AVS 2080.
- AVS 2090 Livestock Exhibition Techniques 2** (1) Students learn techniques associated with exhibition and evaluation of beef, dairy, equine, poultry, and swine. *Preq:* AVS 1510. *Coreq:* AVS 2091.
- AVS 2091 Livestock Exhibition Techniques Laboratory 0** (2) Non-credit laboratory to accompany AVS 2090. *Coreq:* AVS 2090.
- AVS 2110 Meat Processing Techniques 2** (1) Examines the basic principles of food animal processing. Laboratories include hands-on opportunities harvesting a variety of livestock, carcass evaluation, carcass fabrication and value-added meat products. Students also gain understanding in Hazard Analysis and Critical Control (HACCP) certification and meat inspection. *Preq:* AVS 1500. *Coreq:* AVS 2111.
- AVS 2111 Meat Processing Techniques Laboratory 0** (2) Non-credit laboratory to accompany AVS 2110. *Coreq:* AVS 2110.
- AVS 2120 Small Ruminant Techniques 2** (1) Basic principles of the production of small ruminant animals are discussed and demonstrated. Students receive hands on experience in the management, production and processing of sheep and goats. Activities include handling, health care, lambing or kidding, and fiber, milk and meat production. Students may only take one techniques course per semester. *Preq:* AVS 1510. *Coreq:* AVS 2121.
- AVS 2121 Small Ruminant Techniques Laboratory 0** (2) Non-credit laboratory to accompany AVS 2120. *Coreq:* AVS 2120.
- AVS 3010 Anatomy and Physiology of Domestic Animals 4** (3) Study of physiology and associated anatomy of the body systems, including nervous, skeletal, muscular, respiratory, digestive, circulatory, urinary, reproductive, and endocrine systems. Designed primarily for students in Animal and Veterinary Sciences. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* AVS 3011.
- AVS 3011 Anatomy and Physiology of Domestic Animals Laboratory 0** (3) Non-credit laboratory to accompany AVS 3010. *Coreq:* AVS 3010.
- AVS 3020 Livestock Selection and Evaluation I 2** (1) Selection and evaluation of the meat species of livestock with application of theory applied in multiple field exercises. *Coreq:* AVS 3021.
- AVS 3021 Livestock Selection and Evaluation I Laboratory 0** (2) Non-credit laboratory to accompany AVS 3020. *Coreq:* AVS 3020.
- AVS 3090 Principles of Equine Evaluation 2** (4) Discusses the selection and evaluation of equines for various disciplines. Emphasizes current industry standards with regard to form to function. Students place classes of four horses and develop oral reasons to defend their placing. Opportunities for competitive horse judging teams are available.
- AVS 3100 Animal Health 3** (3) Discusses basic principles of animal health. Emphasizes disease prevention in beef cattle, dairy cattle, goats, horses, poultry, and swine. The most common and important diseases and zoonosis of farm animals are explained. *Preq:* AVS 1500.
- AVS 3110 Dairy Cattle Selection 2** (1) Dairy selection and evaluation methods are studied, including evaluation according to the Purebred Dairy Cattle Association scorecard, linear evaluation, pedigrees, and Dairy Herd Improvement Association records. Emphasizes presentation of oral reasons. *Coreq:* AVS 3111.
- AVS 3111 Dairy Cattle Selection Laboratory 0** (2) Non-credit laboratory to accompany AVS 3110. *Coreq:* AVS 3110.
- AVS 3150 Animal Welfare 3** (3) Discussion of past, present, and future human/animal interaction. Topics include wild animals, domestication, animal welfare organizations, animal rights organizations, welfare assessment, animal agriculture, animal research, and other current topics. *Preq:* Junior standing.
- AVS 3230 Poultry and Poultry Products Evaluation 2** (4) Selection of layers, broilers, and turkeys. Grading of poultry products according to USDA grade standards is also studied. Students are eligible to compete in intercollegiate poultry judging contests. May be repeated for a maximum of four credits.
- AVS 3600 Internship 1-12** (1-12) Off-campus, preplanned, reviewed, approved, and supervised educational experience in an area related to animal and veterinary sciences. Based on a multifaceted work experience in a highly structured professional environment. Students submit periodic written reports and a final written and oral report. To be taken Pass/No Pass only. *Preq:* Junior standing in Animal and Veterinary Sciences and consent of instructor.
- AVS 3700 Principles of Animal Nutrition 3** (3) Familiarizes students with nutrients and feeds used in livestock and specialty animal production. Methods of evaluating common feed-stuffs are covered along with a survey of the functioning of the various digestive systems. Practical aspect to feeding each species is covered. Includes Honors sections. *Preq:* AVS 1500 and CH 1020.
- AVS 3750 Applied Animal Nutrition 3** (2) Students learn procedures for formulating diets that meet nutrient requirements of livestock and poultry, utilizing traditional mathematical approaches and computerized formulation. Computerized least-cost formulation of diets is covered along with familiarization with feeding systems and approaches. Includes Honors sections. *Preq:* AVS 3700. *Coreq:* AVS 3751.
- AVS 3751 Applied Animal Nutrition Laboratory 0** (2) Non-credit laboratory to accompany AVS 3750. *Coreq:* AVS 3750.
- AVS 3850 Equine Behavior and Training 2** (6) Introduces students to the initial processes in gentling and riding young horses. Students work with two- and three-year-old horses to desensitize them to stimuli in preparation for riding. Students do groundwork and put the initial rides on the horses. *Preq:* AVS 2050.
- AVS 3860 Advanced Equine Behavior and Training 2** (6) Students train young horses advanced skills in western or English disciplines. Students actively prepare horses for show or sale and participate in a show or marketing/sale of their assigned horse. Develops students' negotiation and communication skills, industry insight, and industry-specific jargon. May be repeated for a maximum of four credits. *Preq:* AVS 3850.
- AVS 3900 Practicum 1-3** (1-3) On-campus, preplanned, supervised learning experience in an area related to animal and veterinary sciences. Gives experience not covered in other classwork. May be repeated for a maximum of four credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor supervising practicum.
- AVS 4000 Animal and Veterinary Sciences Professional Development 1** (1) Career development in the animal and veterinary sciences field by resume and interview preparation, learning about career opportunities, and interaction with industry professionals. *Preq:* Senior standing.
- AVS 4010 Beef Production 4** (3) Discusses breeding, feeding, reproduction, and management of beef cattle. Emphasizes production systems integrating disciplines of animal agriculture into management plans and alternatives. Practical applications of beef production and management practices are also presented. Includes Honors sections. *Preq:* AVS 3700. *Coreq:* AVS 4011.
- AVS 4011 Beef Production Laboratory 0** (2) Non-credit laboratory to accompany AVS 4010. *Coreq:* AVS 4010.
- AVS 4050 Advanced Selection and Evaluation 2** (4) Special and advanced training in selection and evaluation of breeding, performance, and market animals or their products. Species used are beef and dairy cattle, sheep, swine, and horses. *Preq:* AVS 3020 or AVS 3090 or AVS 3110 or FDSC 3040; and consent of instructor.
- AVS 4060 Seminars and Related Topics 2** (3) Students conduct in-depth library research on current topics related to animal science and give formal presentations using multimedia technology. Students also prepare scientific posters, learn interviewing skills, prepare résumés, and observe professional speakers. *Preq:* Senior standing.
- AVS 4090 Selected Topics 1-3** (1-3) Topics of interest to students at the undergraduate, graduate, and professional levels. Provides experience with problems not covered in other courses or on thesis research. May be repeated for a maximum of six credits, but only if different topics are covered.

- AVS 4100\* Domestic Animal Behavior** 3 (3) Provides knowledge and understanding of behavior related to perception, learning, sociality, reproduction, feeding, and health for application in production, training, and design of environments for optimum health and welfare of domestic animals. *Preq:* AVS 1500 and AVS 1510; and Junior standing.
- AVS 4110\* Animal Growth and Development** 3 (3) Integration of the nutritional, physiological, and genetic basis for animal growth and development with application to livestock and poultry production. Includes the cellular and molecular mechanisms controlling these processes and emphasizes the genes that regulate animal products (meat, eggs, wool, and milk). *Preq:* AVS 3010.
- AVS 4120\* Advanced Equine Management** 4 (3) Further discussion of special considerations of the equine regarding housing, manure management, nutrition, reproduction, transportation, and behavior. Students gain insight into how horses differ from other livestock species and their unique requirements for the above systems. Includes Honors sections. *Preq:* AVS 3700. *Coreq:* 4121.
- AVS 4121\* Advanced Equine Management Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4120. *Coreq:* AVS 4120.
- AVS 4130\* Animal Products** 3 (2) Introduction to the safe and humane production of red meat, poultry, and dairy products. Includes HACCP principles and production of value-added animal products. *Coreq:* AVS 4131.
- AVS 4131\* Animal Products Laboratory** 0 (3) Non-credit laboratory to accompany AVS 4130. *Coreq:* AVS 4130.
- AVS 4140\* Basic Immunology** 3 (3) Introduction to the immune system of vertebrate animals, with an emphasis on structure, function, regulation, and cellular and molecular mechanisms of immune responses. Includes Honors sections. May also be offered as BIOL 4140 or MICR 4140. *Preq:* BIOL 4610 and MICRO 3050.
- AVS 4150\* Contemporary Issues in Animal Science** 3 (3) Provides knowledge, understanding, and critical analytical skills on current issues in animal agriculture in diverse regional, national, and global social-cultural and political environments as they impact animals and man. *Preq:* Junior standing.
- AVS 4160\* Equine Exercise Physiology** 4 (3) Integration of muscle, bone, cartilage, cardiovascular, and respiratory systems as related to the equine athlete. Encompasses biomechanics, kinetics, and kinesiology related concepts specific to the horse. Further discussion of diseases related to specific systems is covered. *Preq:* AVS 3010. *Coreq:* AVS 4161.
- AVS 4161\* Equine Exercise Physiology Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4160. *Coreq:* AVS 4160.
- AVS 4170\* Animal Agribusiness Development** 2 (1) Team-based development of a business relating to the animal industries. Students develop the business from the initial idea through operations. Focuses on the development of the business plan, including financials, personnel management, and resources needed. *Preq:* ACCT 2010; and ECON 2110 or ECON 2120. *Coreq:* AVS 4171.
- AVS 4171\* Animal Agribusiness Development Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4170. *Coreq:* AVS 4170.
- AVS 4200\* Poultry Science On-line** 3 (3) On-line course covering the physiology, nutrition, health, reproduction, genetics, breeding, housing, and management of commercial poultry species, including the processing of meat and egg products.
- AVS 4220 Special Problems** 1-3 (1-3) Laboratory, library, or field study of problems related to animal and veterinary sciences, emphasizing development and testing of hypothesis and reporting of results. May be repeated for a maximum of four credits. *Preq:* Junior standing and consent of instructor supervising study.
- AVS 4240 Immunology Laboratory** 1 (3) This course is designed to apply the knowledge gained in MICR 4140, Immunology lecture, in an applied setting. The experiments in this beginning immunology laboratory are designed to study both the innate and acquired immune systems. Experimentation into the formation, function and detection of antibodies provides students with skills in basic immunologic techniques. May also be offered as BIOL 4240 or MICR 4240. *Preq or concurrent enrollment:* MICR 4140.
- AVS 4410 Animal and Veterinary Sciences Teaching Experience** 1-3 (1-3) Formal teaching experience related to animal and veterinary sciences supervised by a faculty member. May involve classroom instruction, educational material development, and/or student evaluation and assessment. Students submit periodic written reports and a final written and oral report. May be repeated for a maximum of four credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.
- AVS 4420 Animal and Veterinary Sciences Extension Experience** 1-3 (1-3) Formal experience in extension education. Students are involved in development, implementation, or assessment of adult or youth educational programs related to animal and veterinary sciences, under supervision of extension professionals. Students submit periodic written reports and a final written and oral report. May be repeated for a maximum of four credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.
- AVS 4430\* AVS International Experience** 1-3 (1-3) Preplanned and approved international education/cultural experience supervised by an Animal and Veterinary Sciences faculty member. Periodic reports or record keeping are required. Final report and oral presentation are required at the end of the experience. May be repeated for a maximum of four credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.
- AVS 4440 AVS Animal Agribusiness Travel Experience** 2 (1) Classroom and travel course to expose students to animal production operations, agribusiness, and industry leaders across various geographical areas. Travel is conducted during spring break and includes visits to farms, universities, and agribusinesses. Additional fee is required. To be taken Pass/No Pass only. *Preq:* Junior standing in Animal and Veterinary Sciences and consent of instructor. *Coreq:* AVS 4441.
- AVS 4441 AVS Animal Agribusiness Travel Experience Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4440. *Coreq:* AVS 4440.
- AVS 4500 Sustainable Livestock Production Systems** 4 (3) Critical analysis of sustainable livestock production systems and associated factors. Principles of decision making, business analysis, management practices, resource assessment and allocation are covered in a variety of sustainable livestock production schemes. *Coreq:* AVS 4501.
- AVS 4501 Sustainable Livestock Production Systems Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4500. *Coreq:* AVS 4500.
- AVS 4530\* Animal Reproduction** 3 (2) Reproductive physiology and endocrinology of mammals with emphasis on farm animals and frequent reference to reproduction in laboratory animals and humans. Includes Honors sections. *Preq:* AVS 1500 and AVS 3010. *Coreq:* AVS 4531.
- AVS 4531\* Animal Reproduction Laboratory** 0 (2) Non-credit laboratory to accompany AVS 4530. *Coreq:* AVS 4530.
- AVS 4550\* Animal Reproductive Management** 2 (1) Physiology and endocrinology of pregnant and nonpregnant cows are discussed. Emphasizes methods of artificial insemination, pregnancy detection, and computer record keeping to achieve a high level of reproductive efficiency in cattle. *Preq:* AVS 1500 and AVS 3010. *Preq or concurrent enrollment:* AVS 4530. *Coreq:* AVS 4551.
- AVS 4551\* Animal Reproductive Management Laboratory** 0 (3) Non-credit laboratory to accompany AVS 4550. *Coreq:* AVS 4550.
- AVS 4650\* Animal Physiology I** 3 (3) Advanced study of the physiological systems of domestic animals as these systems relate to the integrated functions of the body. Exposes students to advanced physiological concepts and current literature perspectives on a variety of body systems and processes. Students are expected to have completed introductory coursework in physiology and biochemistry.
- AVS 4670\* Animal Physiology II** 3 (3) Advanced course extending coverage of major and current topics in animal physiology across species not previously covered in AVS 4650. Major topics include digestive physiology in nonruminant and ruminant species, reproductive physiology, muscle physiology, and general aspects of avian physiology. Students are expected to have completed introductory coursework in physiology and biochemistry.
- AVS 4700\* Animal Genetics** 3 (3) Fundamental principles relating to the breeding and improvement of livestock, including variation, heredity, selection, linebreeding, inbreeding, crossbreeding, and other related subjects. Includes Honors sections.
- AVS 4800\* Vertebrate Endocrinology** 3 (3) Introduction to the basic principles of neuro-endocrine integration and homeostatic maintenance in vertebrates. Comparative morphology and physiology of various endocrine tissues and hormone chemistry and modes of action are considered. May also be offered as BIOL 4800. *Preq:* BIOL 3030. Students who have not completed BIOL 3030, but who have completed coursework in organic chemistry, may request an override from the instructor.

**AVS 4910 Animal and Veterinary Sciences Undergraduate Research Experience** 1-3 (1-3) Formal laboratory, library, or field study of problems related to animal and veterinary sciences, emphasizing hypothesis development, testing, and reporting results. Projects are preplanned, reviewed, and approved. Students submit periodic written reports and final written and oral reports. May be repeated for a maximum of four credits. *Preq:* Consent of instructor.

## BIOCHEMISTRY

*Professors:* W. Cao, J. Frugoli, S. Kresovich, H. Luo, W.R. Marcotte, *Chair;* J. Morris, K.S. Smith; *Associate Professors:* F.A. Feltus, A. Lawton-Rauh, H. Liang, K. Paul, M. Sehorn, L.J. Wang; *Assistant Professors:* L.A. Clark, C. Ingram-Smith, M.T. Morris; *Lecturers:* A. Starr-Moss, K. Tsai

**BCHM 1030 Careers in Biochemistry and Genetics** 1 (1) Introduces students to biochemistry and genetics career paths, professional organizations, ethical issues, and requirements for advanced study. Also gives students training in design of a professional portfolio. Credit toward a degree will be given for only one of BCHM 1030, GEN 1030. *Preq:* Biochemistry or Genetics major.

**BCHM 3010 Molecular Biochemistry** 3 (3) Introduces the nature, production, and replication of biological structure at the molecular level and its relation to function. Includes Honors sections. *Preq:* BIOL 1100 and CH 2230, each with C or better.

**BCHM 3020 Molecular Biochemistry Laboratory** 2 (4) Laboratory to accompany BCHM 3010. Introduction to fundamental laboratory techniques in biochemistry and molecular biology and a demonstration of some of the fundamental principles of molecular biology discussed in BCHM 3010. *Preq:* BIOL 1100 and CH 2230, each with C or better. *Preq or concurrent enrollment:* BCHM 3010.

**BCHM 3050 Essential Elements of Biochemistry** 3 (3) Introduction to structure, synthesis, metabolism and function of biomolecules in living organisms. *Preq:* CH 2010 or CH 2230; and BIOL 1030 or BIOL 1100.

**BCHM 3060 Essential Elements of Biochemistry Laboratory** 1 (3) Introduces students to fundamental techniques associated with tissue extraction and analysis of biomolecules. Students learn both principles and practical applications. *Preq:* CH 2010 or CH 2230; and BIOL 1030 or BIOL 1100. *Preq or concurrent enrollment:* BCHM 3050.

**BCHM 4060\* Physiological Chemistry** 3 (3) Studies chemical basis of the mammalian physiological processes of muscle contraction, nerve function, respiration, kidney function, and blood homeostasis. Discusses composition of specialized tissue such as muscle, nerve, blood, and bone and regulation of water, electrolytes, and acid-base balance. *Preq:* BCHM 3050 or CH 2230 or CH 2010.

**BCHM 4230\* Principles of Biochemistry** 3 (3) Study of the chemistry of amino acids, monosaccharides, fatty acids, purines, pyrimidines, and associated compounds leads to an understanding of their properties and the relationship between structure and function that makes them important in biological processes. The use of modern techniques is stressed. *Preq:* CH 2240.

**BCHM 4310\* Physical Approach to Biochemistry** 3 (3) Study of chemical and physical properties of amino acids, lipids, nucleic acids, sugars, and their biopolymers. Physical and mathematical analyses are correlated with biological structure and function. Includes Honors sections. *Preq:* BCHM 3010 with a C or better. *Preq or concurrent enrollment:* CH 3300 or CH 3310.

**BCHM 4320\* Biochemistry of Metabolism** 3 (3) Study of the central pathway of carbohydrate, lipid, and nucleotide metabolism. Emphasizes bioenergetics, limiting reactions, and the regulation and integration of the metabolic pathways. Includes Honors sections. *Preq:* BCHM 3010 and BCHM 4310, each with a C or better.

**BCHM 4330\* General Biochemistry Laboratory** 1 2 (4) Experiments to illustrate current methods used in biochemical research. *Preq or concurrent enrollment:* BCHM 4310.

**BCHM 4340\* General Biochemistry Laboratory II** 2 (4) Continuation of BCHM 4330. *Preq or concurrent enrollment:* BCHM 4320.

**BCHM 4360\* Molecular Biology: Genes to Proteins** 3 (3) Examines how nucleic acids and proteins are synthesized in prokaryotic and eukaryotic cells. Designed for students interested in biochemistry, cell biology, molecular biology, and cell physiology. Includes Honors sections. *Preq:* BCHM 3010 and GEN 3020, each with C or better.

**BCHM 4400\* Bioinformatics** 3 (3) Theory and application of computational technology to analysis of the genome, transcriptome, and proteome. Includes Honors sections. May also be offered as GEN 4400. *Preq:* BCHM 3010 and GEN 3020, each with C or better.

**BCHM 4430\* Molecular Basis of Disease** 3 (3) Topics in heritable human metabolic disorders, including clinical features and newborn screening, genetic testing, the biochemical basis, and treatment. *Preq:* BCHM 3010 or BCHM 3050; and GEN 3000 or GEN 3020; each course with a C or better.

**BCHM 4900 Selected Topics in Biochemistry** 1-4 (1-4) Comprehensive study of selected topics not covered in other courses. May be repeated for a maximum of eight credits, but only if different topics are covered. *Preq:* Consent of instructor.

**BCHM 4910 Directed Research in Biochemistry** 1-8 (3-24) Orientation in biochemical research (i.e., experimental planning, execution, and reporting). May be repeated for a maximum of eight credits. Includes Honors sections. *Preq:* Consent of instructor.

**BCHM 4930 Senior Seminar** 2 (2) Analysis and discussion of papers from the primary literature in the life sciences particularly in biochemistry. Students find pertinent articles in the primary literature and present and analyze the selected reading. Includes Honors sections. *Preq:* BCHM 3010 and GEN 3020, each with a C or better; and one of BCHM 4310 or BCHM 4320 or BCHM 4360 with a C or better.

## BIOSYSTEMS ENGINEERING

*Professor:* T.H. Walker; *Associate Professors:* C.M. Drapcho, T.O. Owino; *Assistant Professors:* C. Darnault, Y. Zheng,

**BE 1990 Creative Inquiry—Biosystems Engineering I** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/No Pass only.

**BE 2100 Introduction to Biosystems Engineering** 2 (1) Overview of topics and engineering application areas that comprise the biosystems engineering profession. Significant emphasis is also given to development of oral and written communication skills needed by the engineering professional, introduction to design methodology, and application of engineering fundamentals to biological systems. *Preq or concurrent enrollment:* ENGR 1070. *Coreq:* BE 2101.

**BE 2101 Introduction to Biosystems Engineering Laboratory** 0 (3) Non-credit laboratory to accompany BE 2100. *Coreq:* BE 2100.

**BE 2120 Fundamentals of Biosystems Engineering** 2 (1) Introduction to fundamental concepts in biosystems engineering, including mass, energy, and momentum balances; mass, heat, and momentum transfer; biological response to environmental variables, biological materials, biological kinetics, and techniques of measurement and analysis of engineering and biological data. Laboratory includes hand-on exercises, problem solving and computer sessions, and oral presentations. *Preq or concurrent enrollment:* MTHS 1060; and ENGR 1070. *Coreq:* BE 2121.

**BE 2121 Fundamentals of Biosystems Engineering Laboratory** 0 (3) Non-credit laboratory to accompany BE 2120. *Coreq:* BE 2120.

**BE 2990 Creative Inquiry—Biosystems Engineering II** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/No Pass only.

**BE 3000 Biosystems Engineering Honors Seminar** 0 (0) Introduces undergraduate students to current faculty research. Project ideas are then developed to prepare students in choosing a research topic for the senior honors thesis. Students are required to attend senior honors thesis presentations. To be taken Pass/No Pass only. *Preq:* Junior standing in departmental honors program.

**BE 3010 Biosystems Engineering Honors Thesis Research** 3 (6) Honors thesis project proposal, initial research, report, and presentation of biosystems engineering project for completion of junior requirements of the Biosystems Engineering Honors program. *Preq:* BE 3000.

**BE 3140 Biosystems Engineering Mechanical Design** 3 (3) Study of basic mechanical design of biosystems. Includes an introduction to biomechanics and biomaterial properties. Studies applications of machine components and their selection related to specific types of biosystems. Team design project is required. *Preq:* CE 2060 or ME 3020.

- BE 3200 Principles and Practices of Geomatics** 3 (2) Basic surveying measurements and computations for engineering project control, mapping, and construction layout. Leveling, earthwork, area, and topographic measurements using levels, total stations and GPS. Application of Mapping via GIS. *Preq:* MATH 1060. *Coreq:* BE 3201.
- BE 3201 Principles and Practices of Geomatics Laboratory 0** (3) Non-credit laboratory to accompany BE 3200. *Coreq:* BE 3200.
- BE 3220 Small Watershed Hydrology and Sedimentology** 3 (3) Fundamental relationships governing rainfall disposition are used as bases for defining the hydrology of watersheds. Emphasizes application of modeling techniques appropriate for runoff and sediment control. *Preq or concurrent enrollment:* CE 3410.
- BE 3700 Practicum 1-3** (1-3) Preplanned internship with an approved employer involved with biosystems engineering endeavors. A minimum 1300 hours of supervised responsibility is required per credit hour. Evaluation is based on activity journal, written/oral report, and an evaluation from the supervisor. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Junior standing and consent of department.
- BE 3990 Creative Inquiry—Biosystems Engineering III** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/No Pass only.
- BE 4000 Biosystems Engineering Honors Thesis** 3 (6) Individual research projects are conducted under the supervision and guidance of a faculty member. Senior honors thesis is required. *Preq or concurrent enrollment:* BE 3010.
- BE 4080\* Land Treatment of Wastewater and Sludges** 3 (3) Principles for designing environmentally acceptable land application systems using municipal and industrial wastewater and sludges are presented. Topics include land-limiting constituent analysis; soil-plant interactions; system equipment and design; system operation and management; public acceptance, social, and regulatory issues. Case studies and field trips are planned. May also be offered as PES 4080. *Preq:* Senior standing.
- BE 4100\* Biological Kinetics and Reactor Modeling** 3 (2) Fundamentals of microbial and biochemical kinetics used in analysis and design of biological systems. Topics include mathematical and computer modeling of biological kinetics and systems, estimating model coefficients, and development of microbial kinetic models as basis for batch and continuous reactor design. *Preq:* BE 2120. *Preq or concurrent enrollment:* MATH 2080. *Coreq:* BE 4101.
- BE 4101\* Biological Kinetics and Reactor Modeling Laboratory 0** (3) Non-credit laboratory to accompany BE 4100. *Coreq:* BE 4100.
- BE 4120\* Heat and Mass Transport in Biosystems Engineering** 3 (3) Fundamentals of heat and mass transport used in engineering design and analysis of biological systems; principles of steady state and transient energy and mass balances, including chemical and biological generation terms. *Preq:* BE 4100.
- BE 4140\* Biosystems Engineering Unit Operations** 3 (2) Applies the basic principles of statics, dynamics, and thermodynamics to design of mechanical and electrical systems supporting biological operations and processes. *Preq:* BE 3140 and ME 3100. *Coreq:* BE 4141.
- BE 4141\* Biosystems Engineering Unit Operations Laboratory 0** (3) Non-credit laboratory to accompany BE 4140. *Coreq:* BE 4140.
- BE 4150\* Instrumentation and Control for Biosystems Engineers** 4 (3) Overview of modern instrumentation techniques and digital electronic components and subsystems to integrate them into digital data acquisition and control systems for biosystems. Laboratory use of equipment is emphasized. Topics include characteristics of instruments, signal conditioning, transducer theory and applications, programmable logic controllers, and digital data acquisition and control. *Preq or concurrent enrollment:* ECE 2070. *Coreq:* BE 4151.
- BE 4151\* Instrumentation and Control for Biosystems Engineers Laboratory 0** (3) Non-credit laboratory to accompany BE 4150. *Coreq:* BE 4150.
- BE 4170\* Applied Instrumentation and Control for Biosystems** 2 (1) Hardware and software implementation of digital data acquisition and control systems for application to agriculture, aquaculture, biotechnology, and other biosystems. Topics include digital electronic circuits and components, microcomputer architecture, interfacing, and programming. *Preq:* BE 4150. *Coreq:* BE 4171.
- BE 4171\* Applied Instrumentation and Control for Biosystems Laboratory 0** (3) Non-credit laboratory to accompany BE 4170. *Coreq:* BE 4170.
- BE 4210 Engineering Systems for Soil Water Management** 2 (1) Presents fundamentals of design related to drainage of lands, irrigation, and modification of the microenvironment for optimum productivity. *Preq or concurrent enrollment:* CE 3410 and MATH 2080. *Coreq:* BE 4211.
- BE 4211 Engineering Systems for Soil Water Management Laboratory 0** (3) Non-credit laboratory to accompany BE 4210. *Coreq:* BE 4210.
- BE 4220\* Hydrologic Modeling of Small Watersheds** 3 (3) Design of structures and development of best management practices for runoff, flood, and sediment control from rural and urban areas, including natural and disturbed watersheds. Topics include modeling of prismatic and non-prismatic channels, culverts, and detention/retention ponds. *Preq:* BE 3220.
- BE 4240 Ecological Engineering** 3 (3) Focuses on engineering solutions to environmental and socioeconomic problems using ecological design principles. Explores ecosystem processes as they pertain to sustainable development, natural resource protection, food and energy production, waste management, and environmental restoration. Engineering fundamentals and ecological modeling are integral components of this course.
- BE 4280\* Biochemical Engineering** 3 (3) Use of microorganisms and enzymes for the production of chemical feedstocks, single-cell protein, antibiotics, and other fermentation products. Topics include kinetics and energetics of microbial metabolism, design and analysis of reactors for microbial growth and enzyme-catalyzed reactions, and considerations of scale-up, mass transfer, and sterilization during reactor design. *Preq or concurrent enrollment:* BE 4100 or CHE 3300.
- BE 4350\* Applications in Biotechnology Engineering** 3 (2) Bioengineering principles applied to the expanding fields of agricultural biotechnology, ecotechnology, and biomedical technology. Specific applications include waste treatment and ecological engineering, bioreactor propagation of plant and animal cells and tissues, applied genomics and synthetic seed production, biosensors and biomonitoring, biological implants and materials biocompatibility. *Preq:* BE 4280 or CHE 4280. *Coreq:* BE 4351.
- BE 4351\* Applications in Biotechnology Engineering Laboratory 0** (3) Non-credit laboratory to accompany BE 4350. *Coreq:* BE 4350.
- BE 4380\* Bioprocess Engineering Design** 3 (2) Design and analysis of systems for processing biological materials. Topics include biotechnology, thermodynamics, transport processes, and biological properties related to bioprocess design and computational simulation. Unit operations include basic bioreactor operation, bioseparations, and preservation techniques. *Preq or concurrent enrollment:* BE 4100 or CHE 3300 or EES 4020. *Coreq:* BE 4381.
- BE 4381\* Bioprocess Engineering Design Laboratory 0** (2) Non-credit laboratory to accompany BE 4380. *Coreq:* BE 4380.
- BE 4400\* Sustainable Energy Engineering** 3 (2) Investigation into merging renewable energy resources, including detailed study of solar, wind, and bioenergy alternatives. Also includes principles, technologies, and performance evaluation of components for these technologies and an introduction to tidal, hydro, geothermal, and other energy; energy conservation; cogeneration; financial, economical, and other issues related to alternative energy sources. May also be offered as CE 4400. *Preq:* Junior standing in an engineering major. *Coreq:* BE 4401.
- BE 4401\* Sustainable Energy Engineering Laboratory 0** (2) Non-credit laboratory to accompany BE 4400. May also be offered as CE 4401. *Coreq:* BE 4400.
- BE 4510\* Newman Seminar and Lecture Series in Natural Resources Engineering** 1 (2) Topics dealing with development and protection of land, air, water, and related resources are covered by seminar with instructor and invited lecturers. Current environmental and/or resource conservation issues are addressed. Includes Honors sections. May also be offered as EES 4510 or FOR 4510. *Preq:* Senior standing.



**BE 4640\* Non-Point Source Management in Engineered Ecosystems** 3 (2) Fundamentals of non-point source pollution, including quantification of environmental impact and ecosystem management related to contaminants and nutrients and to planning and design of ecological systems. *Preq:* MICR 3050 and Senior standing in engineering. *Coreq:* BE 4641.

**BE 4641\* Non-Point Source Management in Engineered Ecosystems Laboratory** 0 (3) Non-credit laboratory to accompany BE 4640. *Coreq:* BE 4640.

**BE 4730 Special Topics in Biosystems Engineering** 1-3 (1-3) Comprehensive study of special topics not covered in other courses. Emphasizes independent pursuit of detailed investigations. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

**BE 4740 Biosystems Engineering Design/Project Management** 2 (1) Study of biological systems design using hydrology principles, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations, and structural principles for project design, scheduling, and cost estimation. Topics also include engineering ethics, professional development, written and oral communication, and job skills. Senior portfolios are also developed. *Preq:* Senior standing in Biosystems Engineering. *Coreq:* BE 4741.

**BE 4741 Biosystems Engineering Design/Project Management Laboratory** 0 (3) Non-credit laboratory to accompany BE 4740. *Coreq:* BE 4740.

**BE 4750 Biosystems Engineering Capstone Design** 2 (4) Applications of hydrology, fluid mechanics, bioprocessing, heat/mass transfer, instrumentation, mechanical unit operations, and structural principles in design; project scheduling; cost estimation; ethics; environmental and social impacts; design drawings; and report documentation. *Preq:* Senior standing in Biosystems Engineering.

**BE 4840\* Municipal Solid Waste Management** 3 (3) Introduction to the problems, regulations, collection, handling, recycling, and disposal of municipal solid wastes in the urban and rural sectors. Emphasizes an integrated waste-management system with resource recovery, composting, incineration, landfill disposals, and their costs. May also be offered as EES 4840. *Preq:* EES 2020 or EES 4010.

**BE 4990 Creative Inquiry—Biosystems Engineering** IV 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be taken twice for a maximum of six credits. To be taken Pass/No Pass only.

## BIOENGINEERING

*Professors:* K. J. L. Burg, R.L. Dooley, R. Figliola, A. Guiseppi-Elie, M. LaBerge, *Chair;* R.A. Latour Jr., N.R. Vyavahare, G. Zhang; *Associate Professors:* R.W. Blob, D. Dean, B.Z. Gao, S.W. Harcum, J. Nagatomi, D. Simionescu, A. Vertegel, C.K. Webb, H. Yao; *Assistant Professors:* F. Alexis, L. Benson, J. DesJardins, A. Foley, M. Harman, D. Kwartowitz, J. Lee, Y. Mei, J. Mercuri, A. Simionescu, T. Ye

**BIOE 1010 Biology for Bioengineers** 1 (1) Provides basic introduction to fundamental principles of molecular and cellular biology. *Preq:* CH 1010.

**BIOE 2010 Introduction to Biomedical Engineering** 3 (3) Provides engineering, biological, and physical science students with an overview of the replacement of human body parts and the problems related to artificial devices. *Preq:* CH 1020; and one of BIOE 1010 or BIOL 1030 or BIOL 1100.

**BIOE 3020 Biomaterials** 3 (2) Study of metallic, ceramic, and polymer materials used for surgical and dental implants; materials selection, implant design, physical and mechanical testing; corrosion and wear in the body. In addition, physical and mechanical properties of tissue as related to microstructure are studied. *Preq:* BIOE 2010 and CH 2010 and MSE 2100. *Coreq:* BIOE 3021.

**BIOE 3021 Biomaterials Laboratory** 0 (3) Non-credit laboratory to accompany BIOE 3020. *Coreq:* BIOE 3020.

**BIOE 3200 Biomechanics** 3 (3) Study of relation between biological and mechanical functions of musculoskeletal tissues such as bone, ligaments, muscles, cartilage, etc.; mechanics of human joints; analysis of implants and implant failure. *Preq:* CE 2010 and MATH 2080.

**BIOE 3210 Biofluid Mechanics** 3 (3) Introduces mechanics of biological fluids (e.g., blood, synovial fluid and physiological solutions) with an emphasis on the formation of biological problems within the context of (1) kinematics, (2) the concept of stress, (3) linear momentum balance, (4) constitutive relations and (5) boundary conditions. *Preq:* CE 2010 and MATH 2080.

**BIOE 3700 Bioinstrumentation and Bioimaging** 3 (2) Introduction of fundamental topics in bioinstrumentation and bioimaging focused on the acquisition and monitoring of vital signals. Basic principles for the selection and appropriate use of instruments for solving bioengineering and medical problems such as microscopy, magnetic resonance imaging, and ultrasounds, among others, are addressed. *Preq:* MATH 2080; and ECE 2020 or ECE 2070. *Coreq:* BIOE 3701.

**BIOE 3701 Bioinstrumentation and Bioimaging Laboratory** 0 (3) Non-credit laboratory to accompany BIOE 3700. *Coreq:* BIOE 3700.

**BIOE 4000 Senior Seminar** 1 (1) Addresses problems to be encountered by bioengineering graduates in professional practice. Invited lecturers and faculty provide lectures and demonstrations. Pertinent information on job interview skills, career placement and guidance, professional registration, professional ethics in bioengineering, entrepreneurship and patents, and business management are provided. To be taken Pass/No Pass only. *Preq:* Senior standing in Bioengineering.

**BIOE 4010 Bioengineering Design Theory** 3 (3) Introduces principles of engineering design and applies them to the design of medical devices. Covers materials selection, fabrication processes, performance standards, cost analysis, and design optimization. Students defend a design project proposal in written and oral form before a faculty jury. *Preq:* BIOE 3020 or BIOE 3070 or BIOE 3200.

**BIOE 4020 Biocompatibility** 3 (2) Guides students through the theory and practice of determining compatibility of biomaterials and medical devices as required by the FDA. Hands-on experiments emphasize host-implant interactions such as toxicity towards tissues using specific techniques, including cell culture, implantation of biomaterials in experimental animals and histopathology. *Preq:* BIOE 3020 and BIOL 4610. *Coreq:* BIOE 4021.

**BIOE 4021 Biocompatibility Laboratory** 0 (3) Non-credit laboratory to accompany BIOE 4020. *Coreq:* BIOE 4020.

**BIOE 4030 Applied Biomedical Design** 3 (1) Creative application of bioengineering and design principles to solving clinically relevant design problems. Team-based development, construction and evaluation of design prototypes in accordance with design theory. Students present results to faculty jury and external collaborators through written reports and oral presentations. *Preq:* BIOE 4010. *Coreq:* BIOE 4031.

**BIOE 4031 Applied Biomedical Design Laboratory** 0 (6) Non-credit laboratory to accompany BIOE 4030. *Coreq:* BIOE 4030.

**BIOE 4120\* Orthopaedic Engineering and Pathology** 3 (3) Interdisciplinary study of clinical orthopaedic cases (bone growth, bone remodeling, osteoarthritis, implant fixation and joint replacements); biomechanical, biomaterials, tribology and clinical diagnosis of failed implants (total joint replacements, fracture fixation and spinal instrumentation); basic concepts of orthopaedic pathology for engineers. *Preq:* BIOE 3020 and BIOE 3200; *Preq or concurrent enrollment:* BIOL 3150.

**BIOE 4150\* Research Principles and Concepts** 1 (1) Introduces seniors and graduate students to principles and practices of scientific research. Topics include developing scientific concepts, developing projects, pursuing research, collaborating in multidisciplinary teams, patenting and publishing technical and scientific information, and reviewing professional and ethical standards of performance. Includes Honors sections.

**BIOE 4200 Sports Engineering** 3 (3) Study of engineering principles involved in sports: body systems in human motion, analysis of gait, basic performance patterns in athletic movements, performance improvements, design of sports equipment. *Preq:* BIOE 3020 and BIOE 3200.

**BIOE 4230\* Cardiovascular Engineering and Pathology** 3 (3) Medical and bioengineering aspects of artificial cardiovascular and vascular devices; physiology and pathological aspects of patients with need for such devices; diagnostic techniques and surgical management of diseases and pathology; design aspects of current devices and selection; state of the art in experiments and human clinical trials. *Preq:* BIOE 3020 and BIOE 3210 and BIOL 3150.

**BIOE 4310\* Medical Imaging** 3 (2) Introduction to the history, physics, and basis of medical imaging devices; including X-ray, Computed Tomography, Magnetic Resonance Imaging, and Ultrasound. Students will understand imaging from both an engineering and clinical perspective. Students will have the opportunity to work with real medical images, to understand the trade-offs between modalities. *Preq:* MATH 2080; and one of ECE 2020 or ECE 2070. *Preq or concurrent enrollment:* BIOE 3700. *Coreq:* BIOE 4311.

**BIOE 4311\* Medical Imaging Laboratory 0 (2)**  
Non-credit laboratory to accompany BIOE 4310.  
*Coreq:* BIOE 4310.

**BIOE 4350\* Computer Modeling of Multiphysics Problems 3 (3)** This course will introduce students to a holistic way to deal with complicated engineering problems using a computer modeling approach. For example, a real-world problem governed by combined mechanical, electrical, thermal, electrochemical and mass-transport phenomena will be dealt with in an integrated and multidisciplinary way rather than the conventional piece-wise single-discipline way. *Preq:* MATH 2080.

**BIOE 4400\* Biotechnology for Bioengineers 3 (3)** Explores the principles necessary to use microorganisms, tissue culture, and enzymes in bioengineering applications, including molecular techniques, fermentation, process scale-up, purification processes, and FDA regulations. Emphasizes production of biopharmaceuticals derived from recombinant systems, including uses in medical systems. *Preq:* BCHM 3050.

**BIOE 4480 Tissue Engineering 3 (2)** Explores the application of engineering principles toward the development of biologically based substitutes that restore, maintain, or improve tissue function. Topics include biodegradable scaffolds, wound healing and tissue repair, cell-matrix interactions, immunology and biocompatibility, stem cells. *Preq:* BIOE 3020 and BIOL 3150. *Preq or concurrent enrollment:* BIOL 4610. *Coreq:* BIOE 4481.

**BIOE 4481 Tissue Engineering Laboratory 0 (3)**  
Non-credit laboratory to accompany BIOE 4480.  
*Coreq:* BIOE 4480.

**BIOE 4490 Drug Delivery 3 (3)** Fundamental principles of controlled drug delivery including drug release mechanisms, physiological barriers, and various types of delivery routes. Specific emphasis is placed on understanding drug delivery technologies and processes to scale up the fabrication of drug delivery systems. *Preq:* BIOE 3020.

**BIOE 4500 Special Topics in Bioengineering 1-4 (1-4)** Comprehensive study of a topic of current interest in the field of biomedical engineering under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits, but only if different topics are covered. Includes Honors sections. *Preq:* Consent of instructor.

**BIOE 4510 Creative Inquiry—Bioengineering 1-3 (1-3)** Disciplinary and multidisciplinary team research projects with the goal of developing the students' skills in literature research, engineering design, and data analysis. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**BIOE 4600 International Bioengineering Research Topics 1-6 (1-6)** Comprehensive study and research exposure relating to bioengineering research topics at an international institution through the Bioengineering study abroad program. Students are exposed to laboratory and research methods while under the direct supervision and guidance of approved international mentors. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.

**BIOE 4610 International Study in Bioengineering 3 (3)** Introduction to selected bioengineering topics through participation in international study abroad summer programs. Offers an international study experience to undergraduates through lectures, guest speakers, tours, and/or laboratory exposure on a selected bioengineering topic chosen annually by the department. *Preq:* Consent of instructor.

**BIOE 4690 International Bioengineering Internship 1-3 (1-3)** Observation and assignment in an international medical school, dental school, hospital, regulatory agency, or industrial department. Course is affiliated with the bioengineering study abroad program and students are under the direct supervision and guidance of approved international mentors. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**BIOE 4710\* Biophotonics 3 (3)** Biophotonics is an interdisciplinary subject of applying photonics to study biological samples from individual cells to the entire body. Introduces fundamental and frontier topics in optical imaging aspects of biophotonics for senior-level undergraduates and graduate students to gain the ability to solve bioimaging-related biomedical problems. *Preq:* MTHS 2080; and PHYS 2210; and either ECE 2070 or ECE 3200.

**BIOE 4760 Biosurface Engineering 3 (2)** Study of how surface design influences the interactions of biomolecules with biomaterials and how this in turn influences implant biocompatibility. Laboratory addresses both the theory and application of various analytical instruments commonly used in bioengineering to characterize biomaterials surfaces and investigate biomolecule-surface interactions. *Preq:* Senior standing in Bioengineering and BCHM 3050. *Coreq:* BIOE 4761.

**BIOE 4761 Biosurface Engineering Laboratory 0 (3)**  
Non-credit laboratory to accompany BIOE 4760.  
*Coreq:* BIOE 4760.

**BIOE 4820\* Biomaterial Implantology 3 (2)** Provides training in the planning and conduct of experimental surgery, including laws and regulations; institutional requirements; selection of animal models; ethical considerations of animal research; preparation of animals for surgery; general and special surgical techniques; aseptic surgical techniques; and basic and applied instrumentation. *Preq:* Junior standing in Bioengineering. *Coreq:* BIOE 4821.

**BIOE 4821\* Biomaterial Implantology Laboratory 0 (3)**  
Non-credit laboratory to accompany BIOE 4820. *Coreq:* BIOE 4820.

**BIOE 4900 Internship 1 (3)** Observation and assignment in a medical school, dental school, hospital, regulatory agency, or industrial department. May be repeated for a maximum of two credits. To be taken Pass/No Pass only. *Preq:* Senior standing in Bioengineering and consent of department chair.

**BIOE 4910 Mentored Research in Bioengineering 1-6 (1-6)** Mentored research training for undergraduate students working with a faculty advisor, including literature review, experimental design, research documentation, and presentation of results. May be repeated for a maximum of six credits. Honors students must take six credits under a single advisor and write an honors thesis. Includes Honors sections. *Preq:* Consent of instructor.

## BIOLOGY

*Professors:* P.H. Adler, R.E. Ballard, W. Chen, G.W. Eidson, V.S. Gallicchio, S.J. Klaine, R.J. Kosinski, M.B. Ptacek, C.D. Rice, B.J. Speziale, T.P. Spira, W.M. Surver, L.A. Temesvari, Y. Wei, A.P. Wheeler, *Chair*; *Associate Professors:* L.J. Bain, W.S. Baldwin, R.W. Blob, M.J. Childress, S.J. DeWalt, J.J. Hains, A.S. Mount, A.D. Smith, S.A. Sparace, D.W. Tonkyn, M.W. Turnbull, P. van den Hurk, X. Yu; *Assistant Professors:* D.G. Bielenberg, T.F. Bruce, S.C. Chapman, Y. Dong, N.R. Espinoza, J.L. Kerrigan, L.G. Rapaport, M.W. Sears; *Senior Lecturers:* J.R. Cummings, R.C. Hardwick, T. Kaisa, T.L. McNutt-Scott, V.C. Minor; *Lecturers:* K.L. Ickes, M.G. Johnson

**BIOL 1010 Frontiers in Biology I 1 (1)** Introduces Biological Sciences majors to University career and library services, evaluation of computer program proficiency, Web page development, Biological Sciences emphasis areas, and Biological Sciences faculty. Students initiate their own Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate programs. *Preq or concurrent enrollment:* BIOL 1030 and BIOL 1050; or BIOL 1100.

**BIOL 1030 General Biology I 3 (3)** First in a two-semester sequence. Includes an evolutionary approach to cells, cellular activities, genetics, and animal diversity emphasizing the processes of science. Credit toward a degree will be given for BIOL 1030 or 1100 only. Includes Honors sections.

**BIOL 1040 General Biology II 3 (3)** Continuation of BIOL 1030. Includes an evolutionary approach to human anatomy and physiology, plant diversity, morphology, and physiology and principles of ecology. Credit toward a degree will be given for BIOL 1040 or 1110 only. Includes Honors sections. *Preq:* BIOL 1030 and BIOL 1050; or BIOL 1100.

**BIOL 1050 General Biology Laboratory I 1 (3)** Laboratory to accompany BIOL 1030. Emphasizes developing laboratory techniques, becoming familiar with biological instrumentation, and performing investigations and interpreting results in the areas of biochemistry, cell biology, and molecular biology. *Preq or concurrent enrollment:* BIOL 1030.

**BIOL 1060 General Biology Laboratory II 1 (3)** Laboratory to accompany BIOL 1040. Emphasizes developing laboratory techniques, becoming familiar with biological instrumentation, and performing investigations and interpreting results in the areas of organismal structure, physiology, and ecology. *Preq or concurrent enrollment:* BIOL 1040.

**BIOL 1090 Introduction to Life Science 4 (3)** Survey of topics in botany, zoology, microbiology, and ecology emphasizing comprehension and practical application of life-science concepts to experiments and activities for the elementary school classroom. Enrollment priority will be given to Early Childhood and Elementary Education majors. *Coreq:* BIOL 1091.

**BIOL 1091 Introduction to Life Science Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 1090. *Coreq:* BIOL 1090.

- BIOL 1100 Principles of Biology I** 5 (4) Introductory course designed for students majoring in biological disciplines. Integrates lecture and laboratory and emphasizes a modern, quantitative, and experimental approach to explanations of structure, composition, dynamics, interactions, and evolution of cells and organisms. High school chemistry is recommended. Credit toward a degree will be given for BIOL 1100 or 1030 only. Includes Honors sections. *Preq* or *concurrent enrollment*: CH 1010. *Coreq*: BIOL 1101.
- BIOL 1101 Principles of Biology I Laboratory** 0 (3) Non-credit laboratory to accompany BIOL 1100. *Coreq*: BIOL 1100.
- BIOL 1110 Principles of Biology II** 5 (4) Continuation of BIOL 1100, emphasizing the study of plants and animals as functional organisms and the principles of ecology. Credit toward a degree will be given for BIOL 1110 or 1040 only. Includes Honors sections. *Preq*: BIOL 1100. *Coreq*: BIOL 1111.
- BIOL 1111 Principles of Biology II Laboratory** 0 (3) Non-credit laboratory to accompany BIOL 1110. *Coreq*: BIOL 1110.
- BIOL 1200 Biological Inquiry Laboratory** 1 (3) Required laboratory experience to accompany BIOL 1220 or BIOL 1230. Focuses on the process and outcomes of scientific inquiry. Students employ scientific methodology in a laboratory environment as well as critical analysis of biological problems in a small group context. *Preq* or *concurrent enrollment*: BIOL 1220 or BIOL 1230.
- BIOL 1220 Keys to Biodiversity** 3 (3) Introduction to scientific inquiry through analysis of biodiversity. Biological foundations for life are studied, including evolution, ecology, genetics, cells, and molecules. Also includes discussion of ethical issues related to biodiversity. Credit toward a degree will be given for only one of BIOL 1220 or BIOL 1230.
- BIOL 1230 Keys to Human Biology** 3 (3) Introduction to scientific inquiry through human biology. Considers biological processes occurring within humans and human impact on global biological processes. Interrelationships ultimately affecting evolution and diversity are explored. Credit toward a degree will be given for only one of BIOL 1220 or 1230.
- BIOL 1910 Directed Research** 1-3 (3-9) Research projects, supervised by faculty in the College of Agriculture, Forestry and Life Sciences introducing research methods. Restricted to outstanding high school students, selected using Governor's School for Science and Mathematics ranking criteria. May be repeated for a maximum of six credits. *Preq*: Entering high school junior or senior status and consent of faculty research supervisor and department in which research is conducted.
- BIOL 2000 Biology in the News** 3 (3) For non-science majors. Students examine current topics of biology appearing in newspapers and other current media. Uses a problem-based learning approach, with students working as teams and individually on areas of interest identified by the class. Students are expected to have completed the General Education Natural Science Requirement prior to enrolling in this course. *Preq*: ENGL 1030.
- BIOL 2010 Biotechnology and Society** 3 (3) Introduction to the theories, fields, and applications of biotechnology, including the structure and function of genes and their manipulation to improve plant and animal productivity and human health. Individual case studies are examined, including social and ethical issues surrounding biotechnology-based research and development. Not open to Genetics majors. *Preq*: BIOL 1200; and one of BIOL 1220 or BIOL 1230; and General Education Natural Science requirement.
- BIOL 2030 Human Disease and Society** 3 (3) Focuses on the basic biology underlying human disease, how disease is understood, and current methods of prevention and treatment of disease. The economics as well as the social and ethical issues surrounding human disease are a common thread throughout the course. *Preq*: (BIOL 1040 and 1060) or BIOL 1110; and one of BIOL 1220 or BIOL 1230.
- BIOL 2040 Environment, Energy and Society** 3 (3) Examines power and energy production, the resultant environmental effects, and the relationship between this technology and society. Introduces historical and contemporary sources of energy and power; the economic, social, and political forces important for types and patterns of development; and the resultant impacts to ecosystems and the environment.
- BIOL 2050 Plant Form and Function** 3 (3) Introductory course for students majoring in plant sciences. Integrates lecture and laboratory and emphasizes fundamental structures and functions of higher plants. *Preq*: BIOL 1030 and BIOL 1050.
- BIOL 2060 Plant Form and Function Laboratory** 1 (1) Laboratory for BIOL 2050. *Preq* or *concurrent enrollment*: BIOL 2050.
- BIOL 2100 Evolution and Creationism** 3 (3) Critical review of the scientific and technological basis for evolutionary theory compared to creationist explanations for the origin and diversity of life. Includes a historical survey of the impact that the evolution/creation debate has had on law, politics, education, and other important aspects of society. Credit toward a degree will be given for only one of BIOL 2100 or PHIL 2100. *Preq*: BIOL 1040 or BIOL 1110; and one of BIOL 1220 or BIOL 1230; and General Education Natural Science requirement.
- BIOL 2110 Introduction to Toxicology** 3 (3) Acquaints students with the field of toxicology, integrates the science of toxicology with regulatory policy, and demonstrates its impact on our daily lives. *Preq*: BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 2200 Biology: Concepts, Issues, and Values** 3 (3) Develops a thorough knowledge of basic biological concepts and issues and explores how these can be incorporated into a system of human values affecting technology, society, and life.
- BIOL 2220 Human Anatomy and Physiology I** 4 (3) Basic introductory course in integrated human anatomy and physiology covering cells and tissues; integumentary, skeletal, muscular, and nervous systems; sensory organs. Physiology is stressed. Structured primarily for Nursing and other health-related curricula. *Preq*: BIOL 1030 and BIOL 1050; or BIOL 1100; and CH 1010 or CH 1050. *Coreq*: BIOL 2221.
- BIOL 2221 Human Anatomy and Physiology I Laboratory** 0 (2) Non-credit laboratory to accompany BIOL 2220. *Coreq*: BIOL 2220.
- BIOL 2230 Human Anatomy and Physiology II** 4 (3) Continuation of BIOL 2220 covering endocrine, reproductive, cardiovascular, lymphatic, respiratory, urinary, and digestive systems; fluid and electrolyte balance. Physiology is stressed. *Preq*: BIOL 2220. *Coreq*: BIOL 2231.
- BIOL 2231 Human Anatomy and Physiology II Laboratory** 0 (2) Non-credit laboratory to accompany BIOL 2230. *Coreq*: BIOL 2230.
- BIOL 3010 Insect Biology and Diversity** 4 (3) Introduction to the study of insects, with emphasis on their structure, function, ecology, and behavior. Identification of commonly encountered species is highlighted. Relationships between insect and human populations are discussed. Control technologies are introduced, with emphasis on environmentally responsible tactics. Offered fall semester only. *Coreq*: BIOL 3011.
- BIOL 3011 Insect Biology and Diversity Laboratory** 0 (3) Non-credit laboratory to accompany BIOL 3010. *Coreq*: BIOL 3010.
- BIOL 3020 Invertebrate Biology** 3 (3) In-depth survey and comparison of free-living invertebrate animals emphasizing functional anatomy, development, and evolutionary relationships. Includes Honors sections. *Preq*: BIOL 1040 and BIOL 1060; or BIOL 1110. *Preq* or *concurrent enrollment*: BIOL 3060.
- BIOL 3030 Vertebrate Biology** 3 (3) Comprehensive survey of vertebrate animals, including their taxonomy, morphology, evolution, and selected aspects of the natural history and behavior. Includes Honors sections. *Preq*: BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 3040 Biology of Plants** 3 (3) Survey of the major groups of plants, their biology, diversity, and evolution. Includes Honors sections. *Preq*: BIOL 1040 and BIOL 1060; or BIOL 1110. *Preq* or *concurrent enrollment*: BIOL 3080.
- BIOL 3060 Invertebrate Biology Laboratory** 1 (3) Survey and comparison of the biology of living invertebrates, examples of which are drawn primarily from the southeastern coast of the United States. *Preq*: Introductory two-semester biology sequence with laboratory. *Preq* or *concurrent enrollment*: BIOL 3020.
- BIOL 3070 Vertebrate Biology Laboratory** 1 (3) Comparative and phylogenetic study of the gross morphology of vertebrates. *Preq* or *concurrent enrollment*: BIOL 3030.
- BIOL 3080 Biology of Plants Practicum** 1 (3) Laboratory exercises that explore the major groups of plants, their biology, diversity, and evolution. *Preq* or *concurrent enrollment*: BIOL 3040.
- BIOL 3130 Conservation Biology** 3 (3) Study of the biological bases for the conservation of flora, fauna, and habitats. Biological factors that influence the decision-making process are also addressed. May also be offered as WFB 3130. *Preq*: BIOL 1030 and BIOL 1050 and BIOL 1040 and BIOL 1060; or BIOL 1100 and BIOL 1110.

- BIOL 3150 Functional Human Anatomy 4 (3)** Introduction to the anatomical structures associated with all organ systems found in the human body at both the gross and microscopic level. Basic physiology is integrated to assist with understanding the function of the anatomical systems. *Preq:* BIOL 1030 and BIOL 1050; or BIOL 1100. *Coreq:* BIOL 3151.
- BIOL 3151 Functional Human Anatomy Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 3150. *Coreq:* BIOL 3150.
- BIOL 3160 Human Physiology 4 (3)** Study of the functional processes associated with the various organ systems in the human body. Students develop a basic understanding of the important and fundamental concepts in human physiology and how organ systems maintain homeostasis. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110; and CH 1020. *Coreq:* BIOL 3161.
- BIOL 3161 Human Physiology Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 3160. *Coreq:* BIOL 3160.
- BIOL 3200 Field Botany 4 (2)** Introductory study of the taxonomy, ecology, and evolution of plants in their natural environment with an emphasis on identification and characteristics of representative species and plant communities in the Carolinas. Includes one or two required Saturday field trips. *Coreq:* BIOL 3201.
- BIOL 3201 Field Botany Laboratory 0 (4)** Non-credit laboratory to accompany BIOL 3200. *Coreq:* BIOL 3200.
- BIOL 3350 Evolutionary Biology 3 (3)** Introduction to basic concepts and underlying principles of modern evolutionary biology. Topics include a historical overview of evolutionary theories, elementary population genetics, principles of adaptation, speciation, systematics and phylogenetic inference, fossil record, biogeography, molecular evolution, and human evolution. *Preq:* GEN 3000 or GEN 3020.
- BIOL 3400 Plant Medicine and Magic 3 (3)** Study of use of compounds of plant and fungal origin as poisons, hallucinogens, and pharmaceuticals. May also be offered as PES 3400. *Preq:* BIOL 1040 and BIOL 1060 and CH 1020.
- BIOL 3510 Biological Anthropology 3 (3)** Study of humans as biological organisms. Examines human evolution, primate social behavior, human physiological variations and disease resistance, and human skeletal anatomy and forensics. May also be offered as ANTH 3510. *Preq:* ANTH 2010 or BIOL 1100.
- BIOL 3530 Forensic Anthropology 3 (3)** Introduction to forensic anthropology, the science that utilizes methods from skeletal biology and archaeology as tools in human identification in a medico-legal context. May also be offered as ANTH 3530. *Preq:* Junior standing.
- BIOL 3940 Selected Topics in Creative Inquiry I 3 (1)** Disciplinary and multidisciplinary group research projects develop the student's ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include BIOL 3940, BIOL 4940 or both. Includes Honors sections. *Preq:* Consent of instructor. *Coreq:* BIOL 3941.
- BIOL 3941 Selected Topics in Creative Inquiry I Laboratory 0 (6)** Non-credit laboratory to accompany BIOL 3940. *Coreq:* BIOL 3940.
- BIOL 4000\* Insect Morphology 4 (3)** Study of insect structure in relation to function and of the variation of form in insects. Includes Honors sections. May also be offered as ENT 4000. *Preq:* ENT 3010. *Coreq:* BIOL 4001.
- BIOL 4001\* Insect Morphology Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 4000. May also be offered as ENT 4001. *Coreq:* BIOL 4000.
- BIOL 4010\* Plant Physiology 3 (3)** Relations and processes pertaining to maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products and liberation of energy. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110; and CH 1020. *Preq or concurrent enrollment:* BIOL 4020.
- BIOL 4020\* Plant Physiology Laboratory 1 (3)** Laboratory exercises and experiments designed to indicate the relations and processes which pertain to maintenance, growth, and reproduction of plants, including absorption of matter and energy, water relations of the plant, utilization of reserve products, and liberation of energy. *Preq or concurrent enrollment:* BIOL 4010.
- BIOL 4050\* Molecular Genetics of Eukaryotes 3 (3)** Molecular genetic analyses of eukaryotes in relation to mutations and repair, complex phenotypes, biochemical pathways, short- and long-term regulation of gene expression, and evolution. May also be offered as GEN 4050. *Preq:* one of the following combinations: BCHM 3010 or BCHM 3050; or GEN 3000 and GEN 3020.
- BIOL 4060\* Introductory Plant Taxonomy 3 (3)** Introduction to the basic principles and concepts of plant systematics with emphasis on the plants of South Carolina. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4070.
- BIOL 4070\* Plant Taxonomy Laboratory 1 (3)** Introduction to basic techniques of plant taxonomy with laboratory and field emphasis on the flora of South Carolina. *Coreq:* BIOL 4060.
- BIOL 4080\* Comparative Vertebrate Morphology 3 (3)** Phylogeny and diversity of vertebrates and study of their comparative morphology, leading to an understanding of the relationships and functioning of living organisms. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4090.
- BIOL 4090\* Comparative Vertebrate Morphology Laboratory 2 (5)** Comparative anatomy of representative vertebrates; methods used in preparing specimens for study and display. Includes Honors sections. *Coreq:* BIOL 4080.
- BIOL 4100\* Limnology 3 (3)** Detailed introduction to the physical, chemical, and biological interrelationships that characterize inland water environments. A fundamental approach to the interactions of components of the environment is developed at a theoretical level. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4110\* Limnological Analyses 2 (1)** Examines a broad range of topics covered with both standing and running fresh waters. About one-third of the laboratory exercises address the major physical components of lakes and streams. The remainder provides rationale and methods for quantitative analyses of biota, as well as some integrated analyses of whole ecosystems. Includes Honors sections. *Preq or concurrent enrollment:* BIOL 4100 or BIOL 4430. *Coreq:* BIOL 4111.
- BIOL 4111 Limnological Analyses Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4110. *Coreq:* BIOL 4110.
- BIOL 4130\* Restoration Ecology 3 (3)** Applies ecological principles to the restoration of disturbed terrestrial, wetland, and aquatic ecosystems. Includes the restoration of soils and waterways, of flora and fauna, and of natural ecological processes such as plant succession and nutrient cycling. May also be offered as ENR 4130. *Preq:* BIOL 3130 or BIOL 4410 or WFB 3130.
- BIOL 4140\* Basic Immunology 3 (3)** Introduction to the immune system of vertebrate animals, with an emphasis on structure, function, regulation, and cellular and molecular mechanisms of immune responses. Includes Honors sections. May also be offered as AVS 4140 or MICR 4140. *Preq:* BIOL 4610 and MICR 3050.
- BIOL 4150\* Insect Taxonomy 3 (1)** Identification of the principal families of the major orders of adult insects. Laboratory work consists of intensive practice of such identification. Lecture material deals with theoretical discussion of taxonomic features observed in the laboratory. May also be offered as ENT 4150. *Preq:* BIOL 4000 or ENT 4000. *Coreq:* BIOL 4151.
- BIOL 4151\* Insect Taxonomy Laboratory 0 (6)** Non-credit laboratory to accompany BIOL 4150. May also be offered as ENT 4151. *Coreq:* BIOL 4150.
- BIOL 4170\* Marine Biology 3 (3)** Survey of the organisms that live in the sea and their adaptations to the marine environment. Emphasizes characteristics of marine habitats, organisms, and the ecosystems. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4200\* Neurobiology 3 (3)** Broad background in neurobiology. Topics include neuroanatomical structure-function; conduction in the neuron; neurite growth and development; neuromuscular junction; chemistry, physiology, and pharmacology of specific neurotransmitters and receptors; visual process; axoplasmic transport; hypothalamic-pituitary regulation; theories of behavior; theories of learning and memory. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.

- BIOL 4240 Immunology Laboratory 1 (3)** This course is designed to apply the knowledge gained in MICR 4140, Immunology lecture, in an applied setting. The experiments in this beginning immunology laboratory are designed to study both the innate and acquired immune systems. Experimentation into the formation, function and detection of antibodies provides students with skills in basic immunologic techniques. May also be offered as AVS 4240 or MICR 4240. *Preq or concurrent enrollment:* MICR 4140.
- BIOL 4250\* Introductory Mycology 3 (3)** Introduction to the biology of all the groups of fungi and some related organisms, with considerations of the taxonomy, morphology, development, physiology, and ecology of representative forms. May also be offered as PLPA 4250. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Preq or concurrent enrollment:* BIOL 4260 or PLPA 4260.
- BIOL 4260\* Mycology Practicum 2 (1)** Application of the principles of mycological techniques, microscopic study of fungi. Examples from all major groups of fungi are included. May also be offered as PLPA 4260. *Preq or concurrent enrollment:* BIOL 4250 or PLPA 4250. *Coreq:* BIOL 4261.
- BIOL 4261\* Mycology Practicum Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4260. May also be offered as PLPA 4261. *Coreq:* BIOL 4260.
- BIOL 4280\* Quantitative Biology 4 (3)** Applies quantitative methods to a wide range of biological problems. Main focus is on building modeling skills using population, physiological, genetic, and evolutionary problems. Also includes a review of statistical principles and introduces basic bioinformatics techniques. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110; and MATH 1080 or MATH 1110. *Coreq:* BIOL 4281.
- BIOL 4281\* Quantitative Biology Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 4280. *Coreq:* BIOL 4280.
- BIOL 4320\* Animal Histology 3 (3)** Structural and functional study of the basic tissues of animals and tissue makeup of organs. Emphasizes light microscopy level with selected tissue studied at the electron microscope level. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4330.
- BIOL 4330\* Animal Histology Laboratory 2 (1)** Microscopic examination of basic animal tissue types and the tissue makeup of organs which comprise systems. Includes Honors sections. *Coreq:* BIOL 4320 and BIOL 4331.
- BIOL 4331\* Animal Histology Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4330. *Coreq:* BIOL 4330.
- BIOL 4340 Biological Chemistry Laboratory Techniques 2 (1)** Theory and application of some of the routine tools and techniques used in biological chemistry. Lectures introduce laboratory theory and provide additional laboratory instructions; discuss results; and conduct student evaluations. Laboratory periods are used to conduct each activity. *Preq or concurrent enrollment:* BCHM 3010 or BCHM 3050. *Coreq:* BIOL 4341.
- BIOL 4341 Biological Chemistry Laboratory Techniques Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 4340. *Coreq:* BIOL 4340.
- BIOL 4360\* Insect Behavior 3 (2)** Fundamentals of insect behavior in an evolutionary and ecological perspective. Laboratory emphasizes generation and testing of hypotheses and observation, description, and quantification of insect behavior. May also be offered as ENT 4360. *Preq:* ENT 3010. *Coreq:* BIOL 4361.
- BIOL 4361\* Insect Behavior Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 4360. May also be offered as ENT 4361. *Coreq:* BIOL 4360.
- BIOL 4400\* Developmental Animal Biology 3 (3)** Events and mechanisms responsible for the development of multicellular animals. Gametogenesis, fertilization, embryonic development, cellular differentiation, morphogenesis, larval forms and metamorphosis, asexual reproduction, regeneration, malignancy, and aging are analyzed in terms of fundamental concepts and control processes. Includes Honors sections. *Preq:* BCHM 3010 or 3050.
- BIOL 4410\* Ecology 3 (3)** Study of basic ecological principles underlying the relationships between organisms and their biotic and abiotic environments. Includes physiological, population, and community ecology, with applications of each to human ecological concerns. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4420\* Biogeography 3 (3)** Study of patterns of distribution of plants and animals in space and time. Includes Honors sections. *Preq:* BIOL 3020 or BIOL 3030 or BIOL 3040.
- BIOL 4430\* Freshwater Ecology 3 (3)** Study of basic ecological principles and concepts as they apply to freshwater environments: rivers and streams, wetlands, lakes and ponds, and reservoirs. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4440\* Freshwater Ecology Laboratory (Lecture Portion) 2 (1)** Laboratory-based course providing a synthesis of major components of freshwater ecosystems. Activities are hypothesis driven and relate to each other to form an overall synthesis of the field. Hands-on experience allows engagement in creative inquiry. *Preq or concurrent enrollment:* BIOL 4430. *Coreq:* BIOL 4441.
- BIOL 4441\* Freshwater Ecology Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4440. *Coreq:* BIOL 4440.
- BIOL 4450\* Ecology Laboratory (Lecture Portion) 2 (1)** Modern and classical approaches to the study of ecological problems discussed in BIOL 4410. Students are introduced to field, laboratory and computer-based analyses of plant and animal populations and communities. Includes Honors sections. *Preq or concurrent enrollment:* BIOL 4410. *Coreq:* BIOL 4451.
- BIOL 4451\* Ecology Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4450. *Coreq:* BIOL 4450.
- BIOL 4460\* Plant Ecology 3 (3)** Ecology of plants in relation to their biotic and abiotic environments. Individual organisms, populations, and communities are considered with an emphasis on seed plants in terrestrial environments. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4470\* Plant Ecology Laboratory (Lecture Portion) 2 (1)** Experimental and observational approach to addressing principles discussed in BIOL 4460. Students are introduced to field and laboratory methods involving individual organisms, populations, and communities. Includes Honors sections. *Preq or concurrent enrollment:* BIOL 4460. *Coreq:* BIOL 4471.
- BIOL 4471\* Plant Ecology Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4470. *Coreq:* BIOL 4470.
- BIOL 4500\* Developmental Biology Laboratory (Lecture Portion) 2 (1)** Examines a broad range of topics concerned with the development of multicellular animals such as gametogenesis, fertilization, embryonic development, cell differentiation, morphogenesis, larval metamorphosis, and regeneration. Laboratory exercises provide the rationale and methods for the descriptive and experimental analysis of development in representative invertebrates and vertebrates. Includes Honors sections. *Preq or concurrent enrollment:* BIOL 4400. *Coreq:* BIOL 4501.
- BIOL 4501\* Developmental Biology Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4500. *Coreq:* BIOL 4500.
- BIOL 4510 Biological Variation in Human Populations 3 (3)** Provides an in-depth discussion of the most influential topics in human skeletal biology. Course explores the history and ethical dilemmas of the field, and examines how biological anthropologists use skeletons to reconstruct patterns of diet, disease, demography and physical activity in human populations. May be offered as ANTH 4510. *Preq:* ANTH 2010.
- BIOL 4540\* Plant Virology 4 (3)** Study of plant viruses: their morphology, biochemistry, purification, and transmission; symptoms resulting from virus infection; virus vector relationships. Serological and nucleic acid hybridization procedures. Diagnosis of viral diseases and the identification of causal agents. Replication of plant viruses, the interaction between viral host and plant genome. Control of plant viral diseases. May also be offered as PLPA 4540. *Preq:* BCHM 3010 or BCHM 3050 or MICR 3050. *Coreq:* BIOL 4541.
- BIOL 4541\* Plant Virology Laboratory 0 (3)** Non-credit laboratory to accompany BIOL 4540. *Coreq:* BIOL 4540. May also be offered as PLPA 4541.
- BIOL 4560\* Medical and Veterinary Parasitology 3 (3)** Introduction to parasitism in the animal kingdom. Emphasizes basic and applied principles related to economically and medically important diseases. Classical and experimental approaches to the study of parasitism are examined in reference to protozoa, helminths, and arthropods. Includes Honors sections. May also be offered as MICR 4560. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4570.
- BIOL 4570\* Medical and Veterinary Parasitology Laboratory (Lecture Portion) 2 (1)** Laboratory to reinforce material presented in BIOL 4560. Introduces students to both live and preserved human/animal parasites. Also introduces techniques used in collection, preservation, and examination of animal parasites. Includes Honors sections. *Coreq:* BIOL 4560 and BIOL 4571.

- BIOL 4571\* Medical and Veterinary Parasitology Laboratory 0** (2) Non-credit laboratory to accompany BIOL 4570. *Coreq:* BIOL 4570.
- BIOL 4580\* Cell Physiology 3** (3) Study of the chemical and physical principles of cell function emphasizing bioenergetics and membrane phenomena. Includes Honors sections. *Preq:* BCHM 3010 or BCHM 3050.
- BIOL 4590\* Systems Physiology 3** (3) Physiological systems of vertebrates and their homeostatic controls. Describes the function of the major physiological systems in terms of anatomical structure and chemical and physical principles. Includes Honors sections. *Preq:* [BIOL 1040 and BIOL 1060; or BIOL 1110]; and [CH 1020; or PHYS 2080 and PHYS 2100; or PHYS 2210 and PHYS 2230.]
- BIOL 4600\* Systems Physiology Laboratory (Lecture Portion) 2** (1) Modern and classical experimental methods are used to demonstrate fundamental physiological principles discussed in BIOL 4590. Students are introduced to computer-aided data acquisition and computer simulations of physiological function. *Preq or concurrent enrollment:* BIOL 4590. *Coreq:* BIOL 4601.
- BIOL 4601\* Systems Physiology Laboratory 0** (2) Non-credit laboratory to accompany BIOL 4600. *Coreq:* BIOL 4600.
- BIOL 4610\* Cell Biology 3** (3) In-depth analysis of how and where intracellular and extracellular molecules control general and specific cellular functions such as gene expression, secretion, motility, signaling, cell-cycle control and differentiation. Taught and graded at a level where students are expected to infer from and integrate cellular events. Includes Honors sections. *Preq:* BCHM 3010 or BCHM 3050.
- BIOL 4620\* Cell Biology Laboratory (Lecture Portion) 2** (1) Laboratory to accompany BIOL 4610. Focuses on molecular and microscopic analysis of eukaryotic cells. *Preq or concurrent enrollment:* BIOL 4610. *Coreq:* BIOL 4621.
- BIOL 4621\* Cell Biology Laboratory 0** (2) Non-credit laboratory to accompany BIOL 4620. *Coreq:* BIOL 4620.
- BIOL 4640\* Mammalogy 4** (3) Origin, evolution, distribution, structure, and function of mammals, with laboratory emphasis on the mammals of the Southeast. *Preq:* BIOL 3030. *Coreq:* BIOL 4641.
- BIOL 4641\* Mammalogy Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4640. *Coreq:* BIOL 4640.
- BIOL 4660\* Evolution of Human Behavior 3** (3) Familiarizes students with the evolutionary basis of human behavior. Examines topics such as altruism, cooperation, mating systems, parental investment, and social systems using diverse examples, from hunter-gatherer to technological societies. May also be offered as ANTH 4660. *Preq:* ANTH 3510 or BIOL 3350 or BIOL 4700 or BIOL 6700 or PSYC 2010.
- BIOL 4670 Principles of Hematology 3** (3) Basic hematological principles as they relate to normal blood cell production, as well as in abnormal conditions that result in diseases of the hematological system. Clinical practice, ethics and controversies in hematology are discussed. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4680\* Herpetology 4** (3) Physiology, functional morphology, ecology, evolution, biomechanics and current literature of amphibians and reptiles. Laboratory study examines morphology and identification of world families and United States genera, as well as southeastern species. Field trips are required. May also be offered as WFB 4680. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4681.
- BIOL 4681\* Herpetology Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4680. May also be offered as WFB 4681. *Coreq:* BIOL 4680.
- BIOL 4690\* Aquatic Insects 3** (1) Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. Includes Honors sections. May also be offered as ENT 4690 or WFB 4690. *Preq:* ENT 3010. *Coreq:* BIOL 4691.
- BIOL 4691\* Aquatic Insects Laboratory 0** (6) Non-credit laboratory to accompany BIOL 4690. May also be offered as ENT 4691 or WFB 4691. *Coreq:* BIOL 4690.
- BIOL 4700\* Behavioral Ecology 3** (3) Historical and modern developments in animal behavior emphasizing the evolutionary and ecological determinants of behavior. A synthesis of ethology and comparative psychology. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4710\* Behavioral Ecology Laboratory (Lecture Portion) 2** (1) Laboratory exercises that explore the behavior of animals. Emphasizes behavioral observation and analysis and presentation of findings in a report format. Includes a semester-long independent research project. *Preq or concurrent enrollment:* BIOL 4700. *Coreq:* BIOL 4711.
- BIOL 4711\* Behavioral Ecology Laboratory 0** (2) Non-credit laboratory to accompany BIOL 4710. *Coreq:* BIOL 4710.
- BIOL 4720\* Ornithology 4** (3) Biology of birds: their origin and diversification, adaptations, phylogeny, classification, structure and function, behavior, ecology, and biogeography. Field identification is emphasized, and field trips are required. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4721.
- BIOL 4721\* Ornithology Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4720. *Coreq:* BIOL 4720.
- BIOL 4730\* History of Modern Biology 3** (3) Examines the intellectual and social factors defining the study of life from the scientific revolution of the 1600s to the modern biological sciences. Investigates the historical origins of biological disciplines and explores the differing cultures, methodologies, and philosophical commitments of these communities. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.
- BIOL 4740\* Primatology 4** (3) Biology of nonhuman primates, including their evolution, taxonomy, physiology, life history, behavioral ecology and conservation. Three field trips are required, during which students conduct behavioral observations and later analyze their data and present it in report format. May also be offered as ANTH 4740. *Preq:* ANTH 3510; and either BIOL 1110 or both BIOL 1040 and BIOL 1060. *Coreq:* BIOL 4741.
- BIOL 4741\* Primatology Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4740. May also be offered as ANTH 4741. *Coreq:* BIOL 4740.
- BIOL 4750\* Comparative Physiology 3** (3) Physiological systems of invertebrates and vertebrates emphasizing environmental adaptation. Physiological principles as they relate to metabolism, thermoregulation, osmoregulation, respiration, and neural and integrative physiology. Includes Honors sections. *Preq:* CH 1020; and either BIOL 1110 or both BIOL 1040 and BIOL 1060.
- BIOL 4760\* Comparative Physiology Laboratory (Lecture Portion) 2** (1) Modern classical experimental methods are used to demonstrate fundamental physiological principles discussed in BIOL 4750. Introduces students to computer-aided data acquisition and manipulation as well as computer simulations of physiological function. Includes Honors sections. *Preq or concurrent enrollment:* BIOL 4750. *Coreq:* BIOL 4761.
- BIOL 4761\* Comparative Physiology Laboratory 0** (2) Non-credit laboratory to accompany BIOL 4760. *Coreq:* BIOL 4760.
- BIOL 4770\* Ichthyology 3** (2) Systematics, life history, distribution, ecology, and current literature of fish. Laboratory study of morphology and identification of U.S. genera, as well as all southeastern species. Field trips are required. *Preq:* BIOL 31040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4771.
- BIOL 4771\* Ichthyology Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4770. *Coreq:* BIOL 4770.
- BIOL 4780 Exercise Physiology 3** (3) Introduction to the physiology of exercise. Focuses on the function and adaptations of body systems in response to exercise. Structured primarily for students interested in Prerehabilitation Sciences. *Preq:* BIOL 2220 and BIOL 2230; or BIOL 3150 and BIOL 3160.
- BIOL 4790 Kinesiology 3** (3) Introduction to the study of human movement. Focuses on the application of biomechanical and motor control principles to human motion, including daily living, sport, and work activities. Structured primarily for students interested in Prerehabilitation Sciences. *Preq:* BIOL 2220 or BIOL 3150.
- BIOL 4800\* Vertebrate Endocrinology 3** (3) Introduction to the basic principles of neuro-endocrine integration and homeostatic maintenance in vertebrates. Comparative morphology and physiology of various endocrine tissues and hormone chemistry and modes of action are considered. May also be offered as AVS 4800. *Preq:* BCHM 3010 or BCHM 3050.
- BIOL 4820\* Laboratory Techniques for Teaching Science 3** (1) Focuses on basic lab skills needed to plan, prepare, and conduct inquiry-based laboratories and to familiarize pre-service teachers with a variety of scientific equipment and their methodologies. Topics include ways to integrate technology into the classroom, lab safety, and the development of inquiry-based classroom activities. May also be offered as EDSC 4820. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* BIOL 4821.
- BIOL 4821\* Laboratory Techniques for Teaching Science 0** (6) Non-credit laboratory to accompany BIOL 4820. *Coreq:* BIOL 4820. May also be offered as EDSC 4821.

**BIOL 4830\* Stem Cell Biology 3 (3)** Stem cells are the focus of intense interest because of their utility for treating human diseases. This course provides a broad treatment of the biology of stem cells and assesses their current therapeutic capacity in clinical medicine. *Preq:* BIOL 4610.

**BIOL 4840\* Human and Comparative Vertebrate Embryology 3 (3)** Study of human and comparative embryology with an introduction to related clinical correlations. Students develop an understanding of normal and abnormal human and comparative vertebrate embryonic development. Includes Honors sections. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.

**BIOL 4860 Natural History 3 (3)** Interdisciplinary examination, through readings and critical discussion, of concepts of nature and biodiversity in relation to human endeavors. Course seeks to achieve a balanced perspective from which to seek compromises between conflicting views of nature. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110.

**BIOL 4870\* Electron and Optical Microscopy Theory 3 (2)** Offers a theoretical and practical introduction to light and electron microscopy. Topics include Koehler illumination, polarization, interference, phase contrast, DIC epifluorescence, laser scanning light microscopy, SEM, TEM, EDS, ultramicrotomy, tomography, and digital imaging. *Preq:* Consent of instructor. *Coreq:* BIOL 4871.

**BIOL 4871\* Electron and Optical Microscopy Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4870. *Coreq:* BIOL 4870.

**BIOL 4890 Clinical Applications and Medical Practice 3 (2)** Explores the various fields, specialties, and subspecialties in medicine. Provides students with the opportunity to shadow physicians in a hospital and/or office setting and to discuss current issues and advances in medicine with practicing physicians and other health care professionals. *Preq:* Consent of instructor. *Coreq:* BIOL 4891.

**BIOL 4891 Clinical Applications and Medical Practices Laboratory 0 (2)** Non-credit laboratory to accompany BIOL 4890. *Coreq:* BIOL 4890.

**BIOL 4910 Undergraduate Research in Biological Sciences 1-4 (1-6)** Mentored research problems introduce undergraduate students to the planning and execution of research and the presentation of research findings. May be repeated for a maximum of eight credits. Honors students must take at least six credits under a single research advisor over two semesters and must write an honors thesis. Includes Honors sections. *Preq:* Consent of instructor.

**BIOL 4920 Internship in Biological Sciences 1-4 (3-12)** Preplanned internship at an advisor-approved facility to give students learning opportunities beyond their classroom experiences. Students submit a Student Internship Contract and a two-page study plan before the internship and a comprehensive report within one week of the end of the internship. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.

**BIOL 4930 Senior Seminar 2 (2)** Capstone course engaging students in analysis and discussion of publications from the technical and non-technical literature in biological sciences and from current topics of biology appearing in other media. Students complete their undergraduate on-line digital portfolios. Emphasis is placed on ethical issues that arise as a result of biological research. *Preq:* Senior standing; COMM 1500 or COMM 2500 or ENGL 3140 or ENGL 3150.

**BIOL 4940 Selected Topics in Creative Inquiry II 2-3 (1)** Disciplinary and multidisciplinary group research projects with the goal of developing the students' ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include BIOL 3940, BIOL 4940 or both. Includes Honors sections. May also be offered as MICR 4940. *Preq:* Consent of instructor. *Coreq:* BIOL 4941.

**BIOL 4941 Selected Topics in Creative Inquiry II Laboratory 0 (3-6)** Non-credit laboratory to accompany BIOL 4940. May also be offered as MICR 4941. *Coreq:* BIOL 4940.

**BIOL 4950 Service Learning in Biology 2-4 (1-2)** Combines service and academic learning while helping pre-college or college students learn about the fundamental aspects of science. Provides lecture and laboratory experiences as students learn to prepare and participate in supervised laboratory teaching for pre-college or college students. May be repeated for a maximum of six credits. *Preq:* Consent of instructor. *Coreq:* BIOL 4951.

**BIOL 4951 Service Learning in Biology Laboratory 0 (3-9)** Non-credit laboratory to accompany BIOL 4950. *Coreq:* BIOL 4950.

**BIOL 4960 Selected Topics 1-4 (1-4)** Lecture coverage of selected topics in cellular and developmental biology, ecology, behavior, evolutionary biology, molecular biology, physiology, systematics, and other topics in the biological sciences. May be repeated or a maximum of nine credits, but only if different topics are covered. *Preq:* Consent of instructor.

**BIOL 4970 Special Topics Laboratory 1-3 (2-9)** Specialized laboratory experiences in cellular and developmental biology, ecology, behavior, evolutionary biology, molecular biology, physiology, systematics, and other topics of interest in the biological sciences. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Consent of instructor.

## BIOMOLECULAR ENGINEERING

**BMOL 4030\* Biotransport Phenomena 3 (3)** Analysis of single and multidimensional steady-state and transient problems in momentum, mass, and energy transfer in biological systems. Mathematical similarities and differences in these mechanisms are stressed, and mathematical descriptions of physiological and engineering systems are formulated. *Preq:* CHE 3300 and MATH 2080.

**BMOL 4230\* Bioseparations 3 (3)** Study of principal methods of separation and purification of bioproducts, such as proteins, amino acids, and pharmaceuticals. Topics include analytical bioseparations, membrane separations, sedimentation, cell disruption, extraction, adsorption, chromatography, precipitation, crystallization, and drying. *Preq:* CHE 3300; and BCHM 3010 or BCHM 3050 or BCHM 4230.

**BMOL 4250\* Biomolecular Engineering 3 (3)** Introduction to basic principles of biomolecular engineering: the purposeful manipulation of biological molecules and processes applied to problems and issues in the life sciences, biotechnology, and medicine. Topics include carbohydrates, proteins, nucleic acids, and lipids with emphasis on their structure-property-function relations; molecular recognition; biochemical pathway engineering; and cell growth. *Preq:* CHE 2300 and CHE 3190.

**BMOL 4260\* Biosensors and Bioelectronic Devices 3 (3)** Development of methodologies used to design, fabricate, and apply biosensors and bioelectronic devices for the environmental, medical, and chemicals industries. Application of the fundamentals of measurement science to optical, electrochemical, mass, and thermal means of signal transduction. Use of the fundamentals of surface science to interpret bio-immobilization and biomolecule-surface interactions. *Preq:* CHE 3300; and BCHM 3010 or BCHM 3050.

**BMOL 4270\* Membranes for Biotechnology and Biomedicine 3 (3)** Students learn principles of membrane science and technology and study membrane applications in the biotechnology and biomedical industries. Advanced topics include surface modification of membranes, synthesis of porous membranes for biomedical applications such as tissue engineering, environmentally responsive membranes, and membrane-based biomedical devices. *Preq:* CHE 3300.

## BIOSYSTEMS TECHNOLOGY

*Professor:* T.R. Dobbins; *Associate Professor:* C.M. Drapcho

**BT 2200 Biosystems Technology I 3 (2)** Introduces fundamental and applied concepts used in bioprocessing for biofuels and other high value compounds. Topics include operation of batch and continuous flow bioreactors, microbial growth in anaerobic and aerobic environments, fermentation for biofuel production, and use of renewable energy in bioprocessing. Laboratory includes hands-on exercises, problem-solving/computer sessions and oral presentations. *Preq:* BIOL 1030 and BIOL 1050 and CH 1010. *Coreq:* BT 2201.

**BT 2201 Biosystems Technology I Laboratory 0 (3)** Non-credit laboratory to accompany BT 2200. *Coreq:* BT 2200.

**BT 2400 Biosystems Technology II 3 (2)** Introduces basic unit operations used in bioprocessing for biofuels and other bioproducts. Covers operation and selection of pumps, heat exchangers, separation systems and sensors used in bioprocessing. Laboratory includes hands-on exercises, problem-solving/computer sessions, and oral presentations. *Preq:* BT 2200. *Coreq:* BT 2401.

**BT 2401 Biosystems Technology II Laboratory** 0 (3) Non-credit laboratory to accompany BT 2400. *Coreq:* BT 2400.

## BUSINESS

*Professor:* M.A. McKnew; *Senior Lecturers:* E.B. De Iulio, S. Edge; *Lecturers:* J.G. Gaubert, M.G. Giebner, R.J. Hebert, R.A. Lucas

**BUS 1010 Business Foundations 1** (1) Introduction to a variety of topics critical to student success, including an overview of Clemson business degrees, on-campus resources available to ensure success, academic advising, business ethics, internships, co-ops, study abroad programs, student organizations, ePortfolios, and Clemson history.

**BUS 2910 Honors Seminar in International Business 1** (1) Introduction to the International Business Honors Program presented through a discussion of thesis expectations, study abroad experiences, and seminars given by returning senior International Business Honors students. To be taken Pass/No Pass only. *Preq:* Membership in Calhoun Honors College.

**BUS 2990 Creative Inquiry—Business 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

**BUS 3910 International Business Honors Thesis Research 1** (1) Students work with a Clemson advisor and an international advisor to develop a research topic for the senior thesis. Students work and conduct research while participating in an approved study abroad. To be taken Pass/No Pass only. *Preq:* BUS 2910.

**BUS 3920 International Business Honors Thesis Proposal 1** (1) Students work with a Clemson advisor and an international advisor to complete a proposal for the senior thesis. Students work and conduct research while participating in an approved study abroad. To be taken Pass/No Pass only. *Preq:* BUS 3910.

**BUS 3990 Creative Inquiry—Business 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

**BUS 4910 International Business Honors Thesis I 3** (3) Students work with an advisor to conduct literature review and research on a senior thesis topic and prepare presentations and thesis drafts based on this work. *Preq:* BUS 3920.

**BUS 4920 International Business Honors Thesis II 3** (3) Students work with an advisor to complete a senior thesis. They prepare and present a seminar on the topic for presentation to faculty and other International Business Honors students. *Preq:* BUS 4910.

**BUS 4990 Creative Inquiry—Business 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.

## COLLEGE OF ARCHITECTURE, ARTS AND HUMANITIES

**CAAH 2010 Cultural Literacies Across Media 3** (3) Hands-on practicum course in which students reflect critically on the cultural, aural, visual, professional and technological literacies learned as a result of a semester-long study abroad experience. May be repeated for a maximum of six credits. *Preq:* Enrollment in a study abroad program and ENGL 1030.

## CIVIL ENGINEERING

*Professors:* R.D. Andrus, *Associate Chair;* N.M. Aziz, J.L. Burati, M.A. Chowdhury, C.H. Huang, J.R. Martin, *Chair;* S.D. Schiff; *Associate Professors:* H.S. Atamturktur, N.B. Kaye, A.A. Khan, L.E. Klotz, J.H. Ogle, W. Pang, B.J. Putman, P.R. Rangaraju, N. Ravichandran, W.A. Sarasua, F.Y. Testik; *Assistant Professors:* Q. Chen, Y. Huang, A. Mishra, K.R. Piratla, A. Poursaei, B. Ross; *Senior Lecturers:* S.F. Csernak, B.G. Nielson, M.M. Steinhagen

**CE 1990 Creative Inquiry—Civil Engineering 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits. *Preq:* Consent of faculty member/mentor.

**CE 2010 Statics 3** (3) Forces and force systems and their external effect on bodies, principally the condition of equilibrium. The techniques of vector mathematics are employed, and the rigor of physical analysis is emphasized. Includes Honors sections. *Preq:* PHYS 1220 with a C or better. *Preq or concurrent enrollment:* ENGR 1070 and MATH 2060.

**CE 2060 Structural Mechanics 4** (3) Builds on statics to develop relationships between external loads on structural elements of civil engineering interest and the resulting internal loads and deformations. Students are exposed to the development of stress and deformation formulas and the identification and use of significant mechanical properties of civil engineering materials. *Preq:* CE 2010 and ENGR 1090 and MATH 2060. *Coreq:* CE 2061.

**CE 2061 Structural Mechanics Laboratory 0** (3) Non-credit laboratory to accompany CE 2060. *Coreq:* CE 2060.

**CE 2080 Dynamics 2** (2) Study of kinetics and kinematics of particles and rigid bodies, work and energy, impact and momentum. *Preq:* CE 2010 and ENGR 1090, each with a C or better, and MATH 2060.

**CE 2550 Geomatics 3** (2) Spatial data collection methods, including surveying, digital photogrammetry and remote sensing, and global positioning systems. Methods and technologies used to manage, manipulate, and analyze spatial and associated attribute data, including geographic information systems. *Preq or concurrent enrollment:* ENGR 2100. *Coreq:* CE 2551.

**CE 2551 Geomatics Laboratory 0** (3) Non-credit laboratory to accompany CE 2550. *Coreq:* CE 2550.

**CE 2990 Creative Inquiry—Civil Engineering 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits. *Preq:* Consent of faculty member/mentor.

**CE 3010 Structural Analysis 3** (3) Calculation of design loads and load paths for buildings and other structures. Use of classical analysis techniques to determine support reactions, internal member forces, and structural displacements of statically determinate and indeterminate structural systems. *Preq:* CE 2060.

**CE 3110 Transportation Engineering Planning and Design 3** (3) Covers planning, design, and operation of transportation facilities, including highways and airports. Includes economic, safety, and environmental considerations. Public transit systems are covered. *Preq:* CE 2550. *Preq or concurrent enrollment:* MATH 3020.

**CE 3210 Geotechnical Engineering 4** (3) Mechanical and physical properties of soils and their relation to soil action in problems of engineering, such as classification, permeability, shearing strength, and consolidation: design of embankments and retaining walls with geotextiles. *Preq:* CE 2060 and GEOL 1010 and GEOL 1030. *Coreq:* CE 3211.

**CE 3211 Geotechnical Engineering Laboratory 0** (3) Non-credit laboratory to accompany CE 3210. *Coreq:* CE 3210.

**CE 3310 Construction Engineering and Management 3** (3) Considers construction contracts, technical specifications, cost estimating, project scheduling, cost control, materials management, quality control, and quality assurance. *Preq:* Junior standing.

**CE 3410 Introduction to Fluid Mechanics 4** (3) Introduction to fluid mechanics, including hydrostatics and fluid flow. Includes principles of mass, momentum, and energy conservation. Other topics include conduit flow, pump systems, and open channel flow. Laboratory experiments familiarize students with laboratory techniques and instrumentation. The Effective Technical Communications Laboratory is used to prepare a presentation for a lab assignment. *Preq:* CE 2080 with a C or better or EM 2020 with a C or better. *Coreq:* CE 3411.

**CE 3411 Introduction to Fluid Mechanics Laboratory 0** (3) Non-credit laboratory to accompany CE 3410. *Coreq:* CE 3410.



- CE 3420 Applied Hydraulics and Hydrology** 3 (3) Study of hydrologic cycle, including precipitation, evapotranspiration, infiltration, and runoff. Includes hydrograph analysis, gradually varied flow in open channel flow, design of stable channels, flood routing, groundwater hydraulics, flood frequency analysis, and hydrologic design. *Preq:* CE 3410.
- CE 3510 Civil Engineering Materials** 4 (3) Introduces students to material science and basic properties of construction materials such as aggregate, Portland cement, asphalt cement, concrete, steel, ceramics, wood, and fibers. Experiments in lab and field trips to nearby plants are required. Oral and written communication skills are an integral part of this course. *Preq:* ENGR 1090 and GEOL 1010 and GEOL 1030. *Preq or concurrent enrollment:* CE 2060 and MATH 3020. *Coreq:* CE 3511.
- CE 3511 Civil Engineering Materials Laboratory** 0 (3) Non-credit laboratory to accompany CE 3510. *Coreq:* CE 3510.
- CE 3520 Economic Evaluation of Projects** 2 (2) Comparison of design alternatives based on engineering economic analysis. Introduces present worth, annual cost, rate of return, and benefit-cost ratio methods. Use of depreciation and taxation in project analysis.
- CE 3530 Professional Seminar** 1 (1) Discusses various professional topics related to skills and techniques for evaluating career opportunities, seeking and obtaining civil engineering employment, career development, professional registration, professional ethics, and other factors necessary for achieving success in a professional career. Enables students to make better decisions that will help them succeed in their careers. *Preq:* Junior standing.
- CE 3870 Junior Honors Project** 1-3 (1-3) Studies or laboratory investigations on special topics in the civil engineering field which are of interest to individual students and faculty members. Arranged on a project basis for a maximum of individual student effort under faculty guidance. May be repeated for a maximum of three credits. *Preq:* Junior standing in Civil Engineering Senior Departmental Honors Program.
- CE 3880 Honors Research Topics** 1 (0) Survey of ongoing research in the Civil Engineering Department to identify potential research topics for further individual study. *Preq:* Junior standing in Civil Engineering Senior Departmental Honors Program.
- CE 3890 Honors Research Skills** 1 (1) Research problem selection, research tools, research reports organization. *Preq:* CE 3880.
- CE 3990 Creative Inquiry—Civil Engineering** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits. *Preq:* Consent of faculty member/mentor.
- CE 4010\* Matrix Structural Analysis** 3 (3) Analysis of determinate and indeterminate structures using the matrix formulation of the direct stiffness method. Consideration is given to commonly faced computer modeling issues and the nonlinear analysis of structures. *Preq:* CE 3010.
- CE 4020 Reinforced Concrete Design** 3 (3) Design of reinforced concrete beams, slabs, columns and footings using ultimate strength design. An introduction to working stress analysis is also included. *Preq:* CE 3010.
- CE 4040\* Masonry Structural Design** 3 (3) Introduction to design of structural elements for masonry buildings, including lintels, walls, shear walls, columns, pilasters, and retaining walls. Reinforced and unreinforced elements of concrete or clay masonry are designed by allowable stress and strength design methods. Introduces construction techniques, materials, and terminology used in masonry. *Preq:* CE 3010.
- CE 4060 Structural Steel Design** 3 (3) Introduction to the design of structural elements found in steel buildings, in particular the design of steel tension members, beams, columns, beam-columns, and connections. Emphasizes the AISC-LRFD Specifications for steel design, though reference is made to the ASD Specification with comparisons made where appropriate. *Preq:* CE 3010.
- CE 4070\* Wood Design** 3 (3) Introduction to wood design and engineering; properties of wood and wood-based materials; design of beams, columns, walls, roofs, panel systems, and connections. *Preq:* CE 3010.
- CE 4080\* Structural Loads and Systems** 3 (3) In-depth discussion of minimum design loads and load combinations. Includes overview of various steel and concrete systems. Discusses practical selection and design issues and design of proprietary building materials and components such as steel joists, diaphragms, engineered wood products, etc. *Preq:* CE 3010.
- CE 4100\* Traffic Engineering: Operations** 3 (3) Basic characteristics of motor-vehicle traffic, highway capacity, applications of traffic control devices, traffic design of parking facilities, engineering studies, traffic safety, traffic laws and ordinances, and public relations. *Preq:* CE 3110.
- CE 4110\* Roadway Geometric Design** 3 (2) Geometric design of roadways, at-grade intersections, and interchanges in accordance with conditions imposed by driver ability, vehicle performance, safety, and economics. *Preq:* CE 3110. *Coreq:* CE 4111.
- CE 4111\* Roadway Geometric Design Laboratory** 0 (3) Non-credit laboratory to accompany CE 4110. *Coreq:* CE 4110.
- CE 4120\* Urban Transportation Planning** 3 (3) Consideration of urban travel characteristics, characteristics of transportation systems, transportation and land-use studies, trip distribution and trip assignment models, city patterns and subdivision layout. May also be offered as CRP 4120. *Preq:* CE 3110.
- CE 4210\* Geotechnical Engineering Design** 3 (3) Study of the relationship of local geology to soil formations, groundwater, planning of site investigation, sampling procedures, determination of design parameters, foundation design, and settlement analysis. *Preq:* CE 3210.
- CE 4240\* Earth Slopes and Retaining Structures** 3 (3) Considers the principles of geology, groundwater and seepage, soil strength, slope stability, and lateral earth pressure and their application to the design of excavations, earth fills, dams, and earth-retaining structures. *Preq:* CE 3210.
- CE 4250 Soil-Structure Interaction** 3 (3) Study of the interaction between soil and structural elements such as pile foundations and retaining structures subjected to static and dynamic loads; application of general purpose finite element software for solving soil-structure interaction problems; introduction to the theory of finite element method, beams on elastic foundation, p-y curves and advanced testing procedures. *Preq:* CE 3210 and CE 3010.
- CE 4330\* Construction Planning and Scheduling** 3 (3) Study of principles and applications of the Critical Path Method (CPM) and Project Evaluation and Review Techniques (PERT). Includes project breakdown and network graphics; identification of the critical path and resulting floats; definition and allocation of materials, equipment, and manpower resources; resource leveling, compression, and other network adjustments; and computer applications using packaged routines. *Preq:* CE 3310.
- CE 4340\* Construction Estimating and Project Control** 3 (3) Instruction in specifications, contracts, and bidding strategies; purchasing and subcontracting policies; accounting for materials, supplies, subcontracts, and labor; procedural details for estimating earthwork, reinforced concrete, steel, and masonry. Also considers overhead and profit items. *Preq:* CE 3310.
- CE 4350\* Infrastructure Project Planning** 3 (3) Covers concepts related to planning, cost estimating, financing and executing public works projects from the agency owner perspective. Advanced concepts of engineering economic analysis, risk analysis and database management systems are addressed. Traditional and innovative project contracting strategies, including incentive contracts and public-private partnerships, are discussed. *Preq:* CE 3520.
- CE 4360\* Sustainable Construction** 3 (3) Presents the why, what and how for sustainable construction projects. Students gain a working understanding of how to minimize the negative impacts of buildings and other large construction projects. *Preq:* CE 3310.
- CE 4370\* Sustainable Energy Project Design and Analysis** 3 (3) Students develop their technical and creative ability to plan and design for a sustainable future. Students perform quantitative analyses of the environmental and economic impacts of engineering alternatives. Students work in small groups and learn techniques for the collaborative, multidisciplinary approach required for sustainable solutions. *Preq:* CE 3310.
- CE 4380\* Construction Support Operations** 3 (3) Describes activities necessary for the completion of a construction job although not specifically recognized as direct construction activities: general conditions, safety, security, quality assurance, value engineering; organizational support features and typical implementation procedures. *Preq:* CE 3310 and MATH 3020.
- CE 4390\* Construction Equipment Selection and Maintenance** 3 (3) Methodology of selecting the right equipment of the right size for each task of the construction job on the basis of power-train characteristics, crew size, terrain conditions, and job requirements. Cycle time, cost, specifications, maintenance, replacement policy, monitoring. *Preq:* CE 3310.

**CE 4400\* Sustainable Energy Engineering 3 (2)** Investigation into merging renewable energy resources, including detailed study of solar, wind, and bioenergy alternatives. Also includes principles, technologies, and performance evaluation of components for these technologies and an introduction to tidal, hydro, geothermal, and other energy; energy conservation; cogeneration; financial, economical, and other issues related to alternative energy sources. May also be offered as BE 4400. *Preq:* Junior standing in engineering. *Coreq:* CE 4401.

**CE 4401\* Sustainable Energy Engineering Laboratory 0 (2)** Non-credit laboratory to accompany CE 4400. May also be offered as BE 4401. *Coreq:* CE 4400.

**CE 4430\* Water Resources Engineering 3 (3)** Extension of the concepts of fluid mechanics to applications in water supply, water resource assessment, water transmission, water distribution networks, pump and pipe selection, pipe networks, and analysis of open channel appurtenances. *Preq:* CE 3410.

**CE 4460\* Flood Hazards and Protective Design 3 (3)** Study of flood hazards and methods of protective design of the built environment; floodplain mapping and delineation; methods for determining base flood elevations. Discusses flood-resistant construction, flood proofing, and governmental regulations. Includes case studies and design projects. *Preq or concurrent enrollment:* CE 3420.

**CE 4470\* Stormwater Management 3 (3)** Evaluation of peak discharges for urban and rural basins, design of highway drainage structures such as inlets and culverts; stormwater and receiving water quality; best management practices, detention and retention ponds, and erosion and sediment control. *Preq:* CE 3420. *Preq or concurrent enrollment:* EES 4010.

**CE 4560\* Pavement Design and Construction 3 (3)** Introduction to design methods, construction practices, maintenance strategies, and decision making process related to pavements. Other topics, such as environmental considerations and special pavement types and materials, are also covered. *Preq:* CE 3110 and CE 3510. *Preq or concurrent enrollment:* CE 3210.

**CE 4570\* Materials Testing and Inspection 3 (3)** Introduction to the role of testing and inspection professionals in civil engineering projects. Uses a practical approach to applying concepts to real-world situations through the completion of several team projects such as material characterization, construction QC/QA, forensic evaluation, and proposal development. *Preq:* CE 3210 and CE 3510.

**CE 4590 Capstone Design Project 3 (1)** Students apply creativity with their engineering knowledge in the solution of open-ended civil engineering problems. Problems are formulated and solutions are evaluated by faculty and practicing engineers. Communication skills are developed through presentations, correspondence and project reports. Students are expected to have completed all required 300-level CE courses and a Technical Design Requirement. *Coreq:* CE 4591.

**CE 4591 Capstone Design Project Laboratory 0 (6)** Non-credit laboratory to accompany CE 4590. *Coreq:* CE 4590.

**CE 4620\* Coastal Engineering I 3 (3)** Introduction to coastal and oceanographic engineering principles, including wave mechanics, wave-structure interaction, coastal water-level fluctuations, coastal-zone processes, and design considerations for coastal structures and beach nourishment projects. *Preq:* CE 3410.

**CE 4820 Groundwater and Contaminant Transport 3 (3)** Basic principles of groundwater hydrology and transport of contaminants in groundwater systems; groundwater system characteristics; steady and transient flow; well hydraulics, design, and testing; contaminant sources, movement and transformations. May also be offered as GEOL 4820. *Preq:* Junior standing in the College of Engineering and Science and GEOL 1010.

**CE 4870 Senior Honors Project 1-3 (1-3)** Studies or laboratory investigations on special topics in civil engineering which are of interest to individual students and faculty members. Arranged on a project basis for a maximum of individual student effort under faculty guidance. May be repeated for a maximum of three credits. *Preq:* Senior standing in Civil Engineering Senior Departmental Honors Program.

**CE 4880 Honors Research I 2-3 (2-3)** Individual research under the direction of a Civil Engineering faculty member. *Preq:* CE 3890.

**CE 4890 Honors Research II 3 (3)** Individual research under the direction of a Civil Engineering faculty member. *Preq:* CE 4880.

**CE 4900 Special Projects 1-3 (1-3)** Studies or laboratory investigations on special topics in civil engineering which are of interest to individual students and staff members. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. May be repeated for a maximum of three credits. *Preq:* Senior standing.

**CE 4910\* Selected Topics in Civil Engineering 1-6 (1-6)** Structured study of civil engineering topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

**CE 4990 Creative Inquiry—Civil Engineering 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits. *Preq:* Consent of faculty member/mentor.

## COLLEGE OF ENGINEERING AND SCIENCE

**CES 1900 Creative Inquiry in Engineering and Science I 1-3 (1-3)** Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.

**CES 2900 Creative Inquiry in Engineering and Science II 1-3 (1-3)** Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Sophomore standing and consent of instructor.

**CES 3900 Creative Inquiry in Engineering and Science III 1-3 (1-3)** Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Junior standing and consent of instructor.

**CES 4900 Creative Inquiry in Engineering and Science IV 1-3 (1-3)** Individual or group projects in engineering and/or science. Projects may be interdisciplinary and involve analysis, design, and/or implementation. Instruction in methods, tools, and equipment will be included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Senior standing and consent of instructor.

## CHEMISTRY

*Professors:* D.P. Arya, G.D. Chumanov, S.E. Creager, R.K. Dieter, S.-J. Hwu, A.L. Kholodenko, J.W. Kolis, R.K. Marcus, W.T. Pennington Jr., D. Perahia, S.J. Stuart, Y.-P. Sun, J.S. Thrasher; *Associate Professors:* J. Brumaghim, K.A. Christensen, B.N. Dominy, J.D. McNeill, R.C. Smith; *Assistant Professors:* J.N. Anker, G. Bhattacharyya, A.G. Tennyson, M. Wetzler, D.C. Whitehead; *Lecturers:* O.E. Geiculescu, T. Hickman, A. Kitaygorodsky, C. McMillen, S. O'Connor, K.A. Pressprich, J. Schroeder, S.J. Schvaneveldt, D.F. Taylor; *Visiting Assistant Professor:* K. Rillings; *Visiting Instructor:* B.S. Lewis

**CH 1010 General Chemistry 4 (3)** Introduction to the elementary concepts of chemistry through classroom and laboratory experience. Emphasizes chemical reactions and the use of symbolic representation, the mole concept and its applications and molecular structure. Credit toward a degree will be given for only one of CH 1010 and CH 1050. *Preq:* CMPT score of 65 or higher or *preq or concurrent enrollment:* MATH 1010 or MATH 1020 or MATH 1030 or MATH 1050. Includes Honors sections. *Coreq:* CH 1011.

**CH 1011 General Chemistry Laboratory 0 (3)** Non-credit laboratory to accompany CH 1010. *Coreq:* CH 1010.

**CH 1020 General Chemistry 4 (3)** Continuation of CH 1010, treating solutions, rates of reactions, chemical equilibrium, electrochemistry, chemistry of selected elements, and an introduction to organic chemistry. Credit toward a degree will be given for only one of CH 1020 or CH 1060. Includes Honors sections. *Preq:* CH 1010 with a C or better. *Coreq:* CH 1021.

**CH 1021 General Chemistry Laboratory 0 (3)** Non-credit laboratory to accompany CH 1020. *Coreq:* CH 1020.

- CH 1050 Chemistry in Context I 4 (3)** The chemistry of societal issues, including air quality, global warming, acid rain, and alternative energy sources is discussed in the context of their impact on society. May not be taken as a prerequisite for organic chemistry. Credit toward a degree will be given for only one of CH 1010 or CH 1050. *Coreq:* CH 1051.
- CH 1051 Chemistry in Context I Laboratory 0 (3)** Non-credit laboratory to accompany CH 1050. *Coreq:* CH 1050.
- CH 1060 Chemistry in Context II 4 (3)** Continuation of CH 1050. Topics include the chemistry of nuclear energy, new energy sources, nutrition, medicines, new materials, and genetic engineering. May not be taken as a prerequisite for organic chemistry. Credit toward a degree will be given for only one of CH 1020 or CH 1060. *Preq:* CH 1010 or CH 1050. *Coreq:* CH 1061.
- CH 1061 Chemistry in Context II Laboratory 0 (3)** Non-credit laboratory to accompany CH 1060. *Coreq:* CH 1060.
- CH 1410 Chemistry Orientation 1 (1)** Lectures, discussions, and demonstrations devoted to health and safety in chemistry laboratories; use of the chemical literature; and career planning. *Preq or concurrent enrollment:* CH 1010.
- CH 1520 Chemistry Communication I 2 (2)** Methods for scientific communication, including oral, written, and electronic formats. Service-learning projects engage participants with community needs pertaining to chemistry issues.
- CH 1990 Creative Inquiry—Chemistry I 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- CH 2010 Survey of Organic Chemistry 3 (3)** Introduction to organic chemistry emphasizing nomenclature, classes of organic compounds, and chemistry of functional groups. For students needing a one-semester course in organic chemistry. Credit toward a degree will be given for only one of CH 2010 or CH 2230. *Preq:* CH 1020.
- CH 2020 Survey of Organic Chemistry Laboratory 1 (3)** Laboratory emphasizing standard techniques of organic laboratory analysis with the synthesis and characterization of organic molecules discussed in CH 2010. Credit will be given for only one of CH 2020 or CH 2270. *Preq:* CH 1020. *Preq or concurrent enrollment:* CH 2010.
- CH 2050 Introduction to Inorganic Chemistry 3 (3)** One semester treatment which emphasizes the properties and reactions of the more common chemical elements. *Preq:* CH 1020.
- CH 2230 Organic Chemistry 3 (3)** Introductory course in the principles of organic chemistry and the derivation of these principles from a study of the properties, preparations, and interrelationships of the important classes of organic compounds. Credit toward a degree will be given for only one of CH 2010 or CH 2230. *Preq:* CH 1020.
- CH 2240 Organic Chemistry 3 (3)** Continuation of CH 2230. *Preq:* CH 2230.
- CH 2270 Organic Chemistry Laboratory 1 (3)** Synthesis and properties of typical examples of the classes of organic compounds. Credit toward a degree will be given for only one of CH 2020 or CH 2270 or CH 2290. *Preq or concurrent enrollment:* CH 2230.
- CH 2280 Organic Chemistry Laboratory 1 (3)** Continuation of CH 2270. *Preq:* CH 2270. *Preq or concurrent enrollment:* CH 2240.
- CH 2290 Organic Chemistry Laboratory 1 (3)** One-semester laboratory for Chemical Engineering students. Credit toward a degree will be given for only one of CH 2270 or CH 2290. *Preq:* CH 2230.
- CH 2990 Creative Inquiry—Chemistry II 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- CH 3130 Quantitative Analysis 3 (3)** Fundamental principles of volumetric, gravimetric, and certain elementary instrumental chemical analyses. *Preq or concurrent enrollment:* CH 3150 or CH 3170.
- CH 3150 Quantitative Analysis Laboratory 2 (6)** Laboratory techniques of volumetric, gravimetric, and elementary instrumental chemical analyses. Credit toward a degree will be given for only one of CH 3150 or CH 3170. *Preq or concurrent enrollment:* CH 3130.
- CH 3170 Quantitative Analysis Laboratory 1 (3)** Standard techniques of analytical chemistry—gravimetric, volumetric, and instrumental. Credit toward a degree will be given for only one of CH 3150 or CH 3170. *Preq or concurrent enrollment:* CH 3130.
- CH 3300 Introduction to Physical Chemistry 3 (3)** One-semester treatment of physical chemistry emphasizing topics that are especially useful in the life sciences, agriculture, and medicine: chemical thermodynamics, equilibrium, solutions, kinetics, electrochemistry, macromolecules, and surface phenomena. Credit toward a degree will be given for only one of CH 3300 or CH 3310. *Preq:* MATH 1060.
- CH 3310 Physical Chemistry 3 (3)** Includes the gaseous state, thermodynamics, chemical equilibria, and atomic and molecular structure, from both experimental and theoretical points of view. Credit toward a degree will be given for only one of CH 3300 or CH 3310. *Preq:* MATH 2060 and PHYS 2210.
- CH 3320 Physical Chemistry 3 (3)** Continuation of CH 3310, including chemical kinetics, liquid and solid state, phase equilibria, solutions, electrochemistry and surfaces. Includes Honors sections. *Preq:* CH 3310.
- CH 3390 Physical Chemistry Laboratory 1 (3)** Experiments are selected to be of maximum value to Chemistry and Chemical Engineering majors. *Preq or concurrent enrollment:* CH 3310 or CHE 2200.
- CH 3400 Physical Chemistry Laboratory 1 (3)** Continuation of CH 3390. *Preq or concurrent enrollment:* CH 3320.
- CH 3600 Chemical Biology 3 (3)** Introduction to the chemical foundations of biological phenomena, focusing on bioorganic, biophysical, bioinorganic, and bioanalytic chemistry principles. *Preq:* CH 2010 or CH 2230.
- CH 3990 Creative Inquiry—Chemistry III 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- CH 4000 Selected Topics in Chemistry 1-3 (1-3)** Comprehensive study of topics of current interest in chemistry. May be repeated for a maximum of twelve credits, but only if different topics are covered.
- CH 4010\* Organometallic Chemistry 3 (3)** Organometallic compounds are useful in applications ranging from large-scale industrial reactions to antibiotics, and this versatility arises from the chemically unique metal-carbon bond. Course begins with fundamental coordination chemistry, then progresses through ligand substitution, oxidative addition/reductive elimination, catalytic transformations and polymerization reactions. Includes Honors sections. *Preq:* CH 2230.
- CH 4020\* Inorganic Chemistry 3 (3)** Basic principles of inorganic chemistry are discussed with special emphasis on atomic structure, chemical bonding, solid state, coordination chemistry, organometallic chemistry, and acid-base theories. The chemistry of certain selected elements is treated. Includes Honors sections. *Preq:* CH 3310 and CH 3320.
- CH 4030 Advanced Synthetic Techniques 2 (6)** Introduction to advanced laboratory techniques in synthesis and characterization of inorganic and organic compounds. Laboratory sessions consist of a set of eight experiments in modern fields of chemistry, including superconductivity, buckminsterfullerene, bioinorganic chemistry, medicinal chemistry, asymmetric synthesis, and polymer chemistry. *Preq:* CH 2050 and CH 2270 and CH 2280; and either CH 3150 or CH 3170.
- CH 4040\* Bioinorganic Chemistry 3 (3)** Covers fundamentals of bioinorganic chemistry with review of necessary inorganic and biochemical concepts. Topics include metal uptake, transport, and storage in biological systems; functions of metals in proteins; metal ion interactions with nucleic acids; physical methods used in bioinorganic chemistry; heavy element toxicity, radiopharmaceuticals and other metallo drugs. Includes Honors sections. *Preq:* BCHM 3010 or CH 2050.
- CH 4110\* Instrumental Analysis 3 (3)** Principles of operation and application of modern chemical instrumentation in the field of analytical chemistry. Topics include basic electronics, statistics, optical, mass, magnetic resonance, electron and x-ray spectroscopies, radiochemistry, and separation science. *Preq:* CH 3310 and CH 3320.

- CH 4120 Instrumental Analysis Laboratory 2** (5) Reinforces principles of chemical instrumentation described in CH 4110 by practical, hands-on experience. Aspects of sample preparation, standardization, data acquisition and interpretation, and report formulation procedures common in chemical analyses are considered for a range of modern instrumental methods. *Preq* or *concurrent enrollment*: CH 4110.
- CH 4130 Chemistry of Aqueous Systems 3** (3) Study of chemical equilibria in aqueous systems, especially natural waters; acids and bases, dissolved CO<sub>2</sub>, precipitation and dissolution, oxidation-reduction, adsorption, etc. Includes Honors sections. *Preq*: CH 1020 or 1060.
- CH 4140\* Bioanalytical Chemistry 3** (3) Survey of selected areas of importance in bioanalytical chemistry. Fundamental principles, advanced topics, and applications of analytical measurements of biomolecules, bioassays, immunoassays, separations, mass spectrometry, method validation, macromolecular crystallography, microscopy, and imaging. *Preq*: CH 3130 and CH 4110.
- CH 4210\* Advanced Organic Chemistry 3** (3) Survey of modern organic chemistry emphasizing synthesis and mechanisms. Includes Honors sections. *Preq*: CH 2240 and CH 3320.
- CH 4250\* Medicinal Chemistry 3** (3) Survey of the pharmaceutical drug discovery process. Covers discovery of candidate compounds, bioassay methods, and associated regulatory and commercial issues. Case studies are selected from the current literature. *Preq*: CH 2240.
- CH 4270\* Organic Spectroscopy 3** (2) Survey of modern spectroscopic techniques used in the determination of molecular structure. Emphasizes the interpretation of spectra: nuclear magnetic resonance, ultraviolet, infrared, mass spectroscopy, optical rotatory dispersion, and circular dichroism. Includes Honors sections. Students are expected to have completed one year each of organic chemistry and physical chemistry. *Coreq*: CH 4271.
- CH 4271\* Organic Spectroscopy Laboratory 0** (3) Non-credit laboratory to accompany CH 4270. *Coreq*: CH 4270.
- CH 4350\* Atomic and Molecular Structure 3** (3) Introduction to quantum theory and its application to atomic and molecular systems. Topics include harmonic oscillator, hydrogen atom, atomic and molecular orbital methods, vector model of the atom, atomic spectroscopy, and molecular spectroscopy. Includes Honors sections. *Preq*: CH 3320.
- CH 4430 Research Problems 1-6** (3-18) Original investigation of an assigned problem in a fundamental branch of chemistry. Work must be carried out under the supervision of a member of the staff. May be repeated for a maximum of six credits. Includes Honors sections. *Preq*: Senior standing in Chemistry.
- CH 4440 Research Problems 1-6** (3-18) Continuation of CH 4430. Original investigation of an assigned problem in a fundamental branch of chemistry. Work must be carried out under the supervision of a member of the staff. May be repeated for a maximum of six credits. Includes Honors sections. *Preq*: Senior standing in Chemistry.
- CH 4500 Chemistry Capstone 3** (1) Students undertake capstone projects in a team format. Projects necessitate the use of electronic and print resources, demonstrate expertise with a specific instrument or experimental technique, require strong collaboration within a team setting, and produce a peer-reviewed oral and written report. *Preq*: Senior standing. *Coreq*: CH 4501.
- CH 4501 Chemistry Capstone Laboratory 0** (6) Non-credit laboratory to accompany CH 4500. *Coreq*: 4500.
- CH 4510\* Frontiers in Polymer Chemistry 3** (3) Survey of selected areas of current research in polymer science with particular emphasis on polymer synthesis. Although a text is required for review and reference, course is primarily literature based and focused on areas of high impact to multidisciplinary technology. *Preq*: CH 2230 and CH 2240 and MSE 4150.
- CH 4520 Chemistry Communication II 1** (1) Methods for scientific communication, including oral, written, and electronic formats. Student presentations focus on current chemical literature topics pertinent to their CH 4430/444 undergraduate research or results of that work are appropriate. *Preq*: CH 1520.
- CH 4710\* Teaching Chemistry 3** (3) Study of topics in chemistry addressed in the context of constructivist methodologies. Also considers laboratory work and management, laboratory safety, and the use of technology in the chemistry classroom. *Preq*: Any 3000-level chemistry course. Students who have not completed a 3000-level chemistry course but have high school teaching experience may request an override from the instructor.
- CH 4990 Creative Inquiry—Chemistry IV 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq*: Consent of faculty member/mentor.
- CHE 1990 Creative Inquiry—Chemical and Biomolecular Engineering 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq*: Consent of faculty member/mentor.
- CHE 2110 Introduction to Chemical Engineering 4** (3) Introduction to fundamental concepts of chemical engineering, including mass and energy balances, PVT relationships for gases and vapors, and elementary phase equilibria; problem-solving and computer skills are developed in lab. *Preq*: CH 1020 and MATH 1080 and PHYS 1220; and one of CHE 1300 or ENGR 1300. *Coreq*: CHE 2111.
- CHE 2111 Introduction to Chemical Engineering Laboratory 0** (2) Non-credit laboratory to accompany CHE 2110. *Coreq*: CHE 2110.
- CHE 2200 Chemical Engineering Thermodynamics I 3** (3) Topics include first and second laws of thermodynamics, ideal gases, PVT properties of real fluids, energy balances with chemical reactions, and thermodynamic properties of real fluids. *Preq*: CHE 2110 and MATH 2060.
- CHE 2300 Fluids/Heat Transfer 4** (3) General principles of chemical engineering and study of fluid flow, fluid transportation, and heat transmission. Special emphasis is placed on theory and its practical application to design. *Preq*: CHE 2110. *Preq* or *concurrent enrollment*: CHE 2200 and MATH 2060. *Coreq*: CHE 2301.
- CHE 2301 Fluids/Heat Transfer Laboratory 0** (2) Non-credit laboratory to accompany CHE 2300. *Coreq*: CHE 2300.
- CHE 2990 Creative Inquiry—Chemical and Biomolecular Engineering 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq*: Consent of faculty member/mentor.
- CHE 3000 Honors Seminar 1** (1) Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists the student in preparing a research proposal for the Senior Thesis. To be taken Pass/No Pass only. *Preq*: CHE 2200 and CHE 2300; and admission to departmental honors program.
- CHE 3070 Unit Operations Laboratory I 3** (2) Laboratory work in the unit operations of fluid flow, heat transfer, and evaporation. Stress is on the relation between theory and experimental results and the statistical interpretation of those results and on report preparation and presentation. *Preq*: CHE 2200 and CHE 2300. *Coreq*: CHE 3071.
- CHE 3071 Unit Operations Laboratory I Laboratory 0** (3) Non-credit laboratory to accompany CHE 3070. *Coreq*: CHE 3070.
- CHE 3190 Engineering Materials 3** (3) Introduction to the fundamental properties and behavior of engineering materials emphasizing polymers, metals, ceramics, and composite materials. *Preq*: CHE 2110. *Preq* or *concurrent enrollment*: CH 2230 and CHE 2200.

**CHE 3210 Chemical Engineering Thermodynamics II 3 (3)** Continuation of CHE 2200. Topics include thermodynamics of power cycles and refrigeration/liquefaction, thermodynamic properties of homogeneous mixtures, phase equilibria, and chemical reaction equilibria. *Preq:* CHE 2200 and MATH 2080.

**CHE 3300 Mass Transfer and Separation Processes 4 (3)** Study of mass transport fundamentals and application of these fundamentals to separation technologies, with emphasis on gas absorption, stripping, distillation, and liquid-liquid extraction. *Preq:* CHE 2300. *Preq or concurrent enrollment:* CHE 3210. *Coreq:* CHE 3301.

**CHE 3301 Mass Transfer and Separation Processes Laboratory 0 (2)** Non-credit laboratory to accompany CHE 3300. *Coreq:* CHE 3300.

**CHE 3530 Process Dynamics and Control 3 (3)** Mathematical analysis of the dynamic response of process systems. Basic automatic control theory and design of control systems for process applications. *Preq:* CHE 2300 and MATH 2080. *Preq or concurrent enrollment:* CHE 3300.

**CHE 3950 Honors Research I 3 (9)** Individual research under the direction of a Chemical Engineering faculty member. *Preq:* CHE 3000.

**CHE 3990 Creative Inquiry—Chemical and Biomolecular Engineering 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**CHE 4010 Transport Phenomena 3 (3)** Mathematical analysis of single and multidimensional steady-state and transient problems in momentum, energy, and mass transfer. Both the similarities and differences in these mechanisms are stressed. *Preq:* CHE 3300 and MATH 2080.

**CHE 4070 Unit Operations Laboratory II 3 (1)** Continuation of CHE 3070 with experiments primarily on the diffusional operations. Additional lecture material on report writing and general techniques for experimental measurements and analysis of data, including statistical design of experiments. *Preq:* CHE 3070 and CHE 3300. *Coreq:* CHE 4071.

**CHE 4071 Unit Operations Laboratory II Laboratory 0 (6)** Non-credit laboratory to accompany CHE 4070. *Coreq:* CHE 4070.

**CHE 4120\* Polymer Engineering 3 (3)** Design-oriented course in synthetic polymers. Topics include reactor design used in polymer production, effect of step versus addition kinetics on reactor design, epoxy curing reactions, polymer solubility, influence of polymerization and processing conditions on polymer crystallinity. *Preq:* CH 2240 and CH 3320.

**CHE 4310 Chemical Process Design I 3 (3)** Steps in creating a chemical process design from original concept to successful completion and operation. Topics include process layout, equipment selection and sizing, safety and environmental evaluation, engineering economics, simulation, evaluation of alternatives, and optimization. *Preq:* CHE 3070 and CHE 3210 and CHE 3300. *Preq or concurrent enrollment:* CHE 4500.

**CHE 4330 Process Design II 3 (1)** Continuation of CHE 4310. Principles of process development, design, and optimization are applied in a comprehensive problem carried from a general statement of the problem to detailed design and economic evaluations. *Preq:* CHE 3300 and CHE 4070 and CHE 4310 and CHE 4500. *Coreq:* CHE 4331.

**CHE 4331 Process Design II Laboratory 0 (6)** Non-credit laboratory to accompany CHE 4330. *Coreq:* CHE 4330.

**CHE 4430 Chemical Engineering Senior Seminar I 1 (1)** Preparation of senior chemical engineering students for entry into the profession. Timely information on job interviewing skills, career placement and guidance, professional registration, professional behavior and ethics, and management of personal finances. Outside speakers are used frequently. To be taken Pass/No Pass only. *Preq or concurrent enrollment:* CHE 4310.

**CHE 4440 Chemical Engineering Senior Seminar II 1 (1)** Working in groups, students present and discuss topics related to professional practice, ethics, business, industrial safety, the environment, and selected technical subjects of interest to society. To be taken Pass/No Pass only. *Preq:* CHE 4430. *Preq or concurrent enrollment:* CHE 4330.

**CHE 4450\* Selected Topics in Chemical Engineering 3 (3)** Topics not covered in other courses, emphasizing current literature, research, and practice of chemical engineering. Topics vary from year to year. May be repeated, but only if different topics are covered. *Preq:* Consent of instructor.

**CHE 4500\* Chemical Reaction Engineering 3 (3)** Review of kinetics of chemical reactions and an introduction to the analysis and design of chemical reactors. Topics include homogeneous and heterogeneous reactions, batch and continuous flow reaction systems, catalysis, and design of industrial reactors. *Preq:* CHE 3210 and CHE 3300 and CH 3320.

**CHE 4910 Special Projects in Chemical Engineering 1-3 (1-3)** Topics requested by students or offered by faculty as the need arises. Topics may include reviews of current research in an area, technological advances, and national engineering goals. May be repeated for a maximum of six credits, but only if different topics are covered. Includes Honors sections.

**CHE 4950 Honors Research II 3 (9)** Individual research under the direction of a chemical engineering faculty member. *Preq:* CHE 3950.

**CHE 4970 Honors Thesis 1 (1)** Preparation of honors thesis based on research conducted in CHE 3950 and CHE 4950. *Preq:* CHE 4950.

**CHE 4990 Creative Inquiry—Chemical and Biomolecular Engineering 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

## CHINESE

*Associate Professors:* Y. An, Y. Zhang; *Lecturer:* S. Chen

**CHIN 1010 Elementary Chinese 4 (3)** Introductory course stressing speaking, listening, and writing. Attention is given to the sound system of Chinese to enable students to distinguish the four tones and to develop basic communication skills. Participation in cultural activities is encouraged. *Coreq:* CHIN 1011.

**CHIN 1011 Elementary Chinese Laboratory 0 (1)** Non-credit laboratory to accompany CHIN 1010. *Coreq:* CHIN 1010.

**CHIN 1020 Elementary Chinese 4 (3)** Continuation of CHIN 1010. *Preq:* CHIN 1010. *Coreq:* CHIN 1021.

**CHIN 1021 Elementary Chinese Laboratory 0 (1)** Non-credit laboratory to accompany CHIN 1020. *Coreq:* CHIN 1020.

**CHIN 2010 Intermediate Chinese 3 (3)** Intermediate course with more emphasis on communication skills and structure. Reading and writing practice without phonetic aids; oral practice in and outside the class, paying special attention to idiomatic usage; introduction to cultural perspectives through readings and cultural activities. *Preq:* CHIN 1020. *Coreq:* CHIN 2011.

**CHIN 2011 Intermediate Chinese Laboratory 0 (1)** Non-credit laboratory to accompany CHN 2010. *Coreq:* CHIN 2010.

**CHIN 2020 Intermediate Chinese 3 (3)** Continuation of CHIN 2010. *Preq:* CHIN 2010. *Coreq:* CHIN 2021.

**CHIN 2021 Intermediate Chinese Laboratory 0 (1)** Non-credit laboratory to accompany CHIN 2020. *Coreq:* CHIN 2020.

**CHIN 2970 Creative Inquiry—Chinese 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member(s).

**CHIN 3050 Chinese Conversation and Composition I 3 (3)** Practice in the spoken language emphasizing vocabulary, word-combinations, pronunciation, and comprehension. Learning practical language skills and intercultural communication by studying various topics. *Preq:* CHIN 2020.

**CHIN 3060 Chinese Conversation and Composition II 3 (3)** Continuation of CHIN 3050. More practice in the spoken language emphasizing vocabulary, word combinations, pronunciation, and comprehension. Learning practical language skills and intercultural communication by studying various topics. *Preq:* CHIN 3050.

**CHIN 3120 Philosophy in Ancient China 3 (3)** Study of the history of Chinese philosophy from fifth century BCE, including Confucianism, Daoism, Moism, legalism, Buddhism, Neo-Daoism, and Neo-Confucianism. Examination of Chinese philosophers' views and arguments on questions of life and death, history and society, education and personal cultivation. May not be used to satisfy general foreign language requirements. May also be offered as PHIL 3120.

**CHIN 3130 Philosophy in Modern China 3 (3)** Study of the history of Chinese philosophy from the 19th century BCE, including Confucianism, Daoism, Moism, legalism, Buddhism, Neo-Daoism, and Neo-Confucianism. Examination of Chinese philosophers' views and arguments on questions of life and death, history and society, education and personal cultivation. May not be used to satisfy general foreign language requirements. May also be offered as PHIL 3130.

**CHIN 3160 Chinese for International Trade I 3 (3)** Study of spoken and written Chinese common to the Chinese-speaking business communities emphasizing business practices and writing/translating business letters and professional documents. Cross-cultural references are provided for comparative analyses of American and Chinese business behavior. Classes are conducted in Chinese. *Preq or concurrent enrollment:* CHIN 2020 and CHIN 3050.

**CHIN 3170 Chinese for Health Professionals I 3 (3)** Study of medical concepts and terminology emphasizing communicative competence in health-related settings in a Chinese-speaking community. Designed for students who plan to work in public health related professions. *Preq:* CHIN 2020 and CHIN 3050.

**CHIN 3970 Creative Inquiry—Chinese 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**CHIN 3980 Directed Reading 3 (3)** Directed readings in Chinese literature, language, society, and culture. Taught in Chinese. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

**CHIN 4010 Pre-Modern Chinese Literature in Translation 3 (3)** Chinese literature from 8th century B.C.E. to 19th century C.E., including poetry, prose, drama, fiction, and literary criticism. All readings and discussions are in English.

**CHIN 4110 Studies in the Chinese Language I: Literature 3 (3)** Advanced training in the spoken and written language through readings in contemporary literature emphasizing vocabulary, syntax, and stylistics. All readings and discussions are in Chinese. *Preq:* CHIN 3060.

**CHIN 4120 Studies in the Chinese Language II: Social Issues 3 (3)** In-depth study of terminology and syntax for specific subject areas in contemporary social issues. All readings and discussions are in Chinese. *Preq:* CHIN 3060.

**CHIN 4160 Chinese for International Trade II 3 (3)** Study of language, concepts, and the environment of Chinese-speaking markets of the world. Considers sociocultural, political, and economic issues relevant to the Chinese-speaking business world and the ramifications of these issues in global marketing. Classes are conducted in Chinese. *Preq:* CHIN 3160.

**CHIN 4170 Chinese for Health Professionals II 3 (3)** Continuation of CHIN 3170 with increased emphasis on managerial aspects of the health-care system in China. Taught in Chinese. *Preq:* CHIN 3170.

**CHIN 4180 Chinese Culture and Society 3 (3)** Examines basic cultural values and the patterns of Chinese social life. Focuses on Chinese social organization and interpersonal dynamics, including the family system, gender identities, social exchanges and networks. All readings and discussions are in English. May not be used to satisfy general foreign language requirements. May also be offered as ANTH 4180.

**CHIN 4970 Creative Inquiry—Chinese 1-4 (1-4)** Continuation of research initiated in CHIN 3970. Students complete their projects and disseminate their research results. *Preq:* CHIN 3970.

**CHIN 4980 Independent Study 1-3 (1-3)** Supervised study and research on selected topics in Chinese studies. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of department chair.

**CHIN 4990 Selected Topics in Chinese Culture 3 (3)** Examination of various social and cultural topics, including art and literature, philosophical and religious traditions, health and healing, and folk and popular cultures. May be repeated for a maximum of six credits, but only if different topics are covered. Readings and discussions are in English. May not be used to satisfy general foreign language requirements.

## COMMUNICATION STUDIES

*Professor:* B.E. Denham; *Associate Professor:* K.O. Jones, *Chair;* *Assistant Professors:* E. Ash, B.E. Kendall, C. Kumanyika, D.L. Linville, J.P. Mazer, A. Pratt, A. Pyle, S. Rhul, J. Sanderson, D.T. Scott, J. Spinda, M.R. Weathers; *Senior Lecturers:* A.Z. Davis, M.H. Glaser, E.R. Smith; *Lecturers:* C. Baker, B. Boatwright, A. Davis, L. Dixon, L. Fecher, P. Matthey, M. Pugh, K. Schoonover, K. Steele, C. Wasilewski

**COMM 1010 Communication Academic and Professional Development I 1 (1)** Introduces students to General Education and Communication Studies major requirements, explains connections between general education and major courses, explores careers in communication, and prepares students to develop digital portfolios, résumés, and interview skills specific to communication professions and/or graduate school. To be taken Pass/No Pass only.

**COMM 1070 Media Representations of Science and Technology 3 (3)** Examines mediated representations of science and technology from a communication perspective. Attention is paid to portrayals/coverage of science and technology in popular film, television, Internet, journalism, and other media. Students examine an array of theoretical issues and case studies in this area.

**COMM 1500 Introduction to Human Communication 3 (2)** Overview of theoretical approaches to the study of communication, including the theory and practice of interpersonal/small group/intercultural/public communication. Includes a laboratory. *Coreq:* COMM 1501.

**COMM 1501 Introduction to Human Communication Laboratory 0 (2)** Non-credit laboratory to accompany COMM 1500. *Coreq:* COMM 1500.

**COMM 1620 Forensic Laboratory 1 (3)** Research, preparation, and practice leading to participation in on-campus and intercollegiate debate and individual events competition. May be repeated for a maximum of four credits.

**COMM 1630 Advanced Forensic Laboratory 1 (3)** Advanced research, preparation, and practice leading to continued participation in on-campus and intercollegiate debate and individual events competition. May be repeated for a maximum of four credits. *Preq:* COMM 1620.

**COMM 2010 Introduction to Communication Studies 4 (3)** Introduces Communication Studies majors to and prepares them for continued study in the discipline by providing them with an overview of important issues, areas of study, and approaches to the field. Includes a writing laboratory experience. *Preq:* COMM 1010. *Coreq:* COMM 2011.

**COMM 2011 Introduction to Communication Studies Laboratory 0 (2)** Non-credit laboratory to accompany COMM 2010. *Coreq:* COMM 2010.

**COMM 2500 Public Speaking 3 (3)** Practical instruction in public speaking; practice in the preparation, delivery, and criticism of short speeches. Develops an understanding and knowledge of the process of communication. Includes a laboratory. Includes Honors sections. *Coreq:* COMM 2501.

**COMM 2501 Public Speaking Laboratory 0 (1)** Non-credit laboratory to accompany COMM 2500. *Coreq:* COMM 2500.

**COMM 3010 Communication Theory 3 (3)** Students explore the breadth and depth of theories within the major frameworks of the communication studies discipline. *Preq:* COMM 2010 with a C or better.

**COMM 3020 Mass Communication Theory 3 (3)** Survey of the breadth and history of theories of mass communication and mass media from the 19th century to the present. Emphasizes contemporary schools of thought, theoretical debates, and the continuing controversies in the field. *Preq:* COMM 2010 with a C or better.

**COMM 3030 Communication Law and Ethics 3 (3)** Major topics in communication law and free expression and in communication ethics. *Preq:* COMM 2010 with a C or better.

**COMM 3050 Persuasion 3 (3)** Study of the processes by which communication influences attitudes, beliefs, and behaviors in our personal, social, civic, and professional lives. After discussion of definitional and methodological issues, particular theories of persuasion are examined. Treatment of political, market-driven, and social persuasion concludes the course. *Preq:* COMM 2010 with a C or better.

**COMM 3060 Discourse, Criticism, and Society 3 (3)** Students explore theoretically-grounded methods of critical and cultural description, analysis, interpretation, and evaluation of public discourse. *Preq:* COMM 2010 with a C or better.

**COMM 3070 Public Communication of Science and Technology 3 (3)** Examines the role of science and technology in society from a communication perspective. Particular attention is paid to this dynamic in public culture. Students examine an array of theoretical issues and case studies in this area. *Preq:* COMM 2010 with a C or better.

- COMM 3080 Public Communication and Popular Culture** 3 (3) Examines artifacts of popular culture, paying particular attention to their relationship to politics and public life. Explores the structures and constraints of the culture industry. Students apply communication principles to various examples. *Preq:* COMM 2010 with a C or better.
- COMM 3090 Visual Discourse and the Public** 3 (3) Examines the role of visibility in society and the cultural implications for ways of seeing. Using visual artifacts of various types, students learn the logic of visual representation. *Preq:* COMM 2010 with a C or better.
- COMM 3100 Quantitative Research Methods in Communication Studies** 3 (3) Explores methods of quantitative communication inquiry, including theory/research relationship, conducting studies, and utilizing statistical software. Methods may include experiments, surveys, and content analysis. *Preq:* COMM 2010 with a C or better.
- COMM 3110 Qualitative Research Methods in Communication Studies** 3 (3) Explores methods of qualitative communication inquiry, including theory/research relationship and conducting studies. Methods may include interviewing, focus groups, textual analysis, and ethnography. *Preq:* COMM 2010 with a C or better.
- COMM 3150 Critical Discourse Theory** 3 (3) Introduction to a variety of theoretical concepts associated with the critical study of public discourse. Students analyze theories related to the strategic use of language and its epistemological characteristics. Theoretical topics may include critical/cultural studies, visual communication, ideology, persona, social change, and identity studies. *Preq:* COMM 2010 with a C or better.
- COMM 3160 Girlhood, Media, and Popular Culture** 3 (3) Explores how the mass media and popular culture contribute to social constructions of girlhood. Employing the critical lens of feminist and communication theories, students examine mediated depictions of girls as well as how girls actively produce and negotiate media and popular culture. May also be offered as WS 3160. *Preq:* COMM 2010 with a C or better or WS 3010.
- COMM 3200 Broadcast Production** 3 (2) Explores the broadcast side of journalism. Students produce broadcast video packages, as well as newscasts. Students learn news writing, filming and video editing. *Coreq:* COMM 3201.
- COMM 3201 Broadcast Production Laboratory** 0 (2) Non-credit laboratory to accompany COMM 3200. *Coreq:* COMM 3200.
- COMM 3210 Communication Across Media Platforms** 3 (3) Provides an overview of the communication convergence strategies and practices used across multiple media platforms, including print, broadcast, Internet and social media. Emphasis is placed on media law, ethics and communication practices used across multiple media platforms. *Preq:* COMM 2010 with a C or better.
- COMM 3220 Communication Design** 3 (2) Provides an overview of the communication theories, tools and techniques available to design, manipulate and convey technological messages and experiences in digital contexts. Provides knowledge and critical skills necessary to consider communication design as an important and inevitable component of communication studies careers. *Coreq:* COMM 3221.
- COMM 3221 Communication Design Laboratory** 0 (2) Non-credit laboratory to accompany COMM 3220. *Coreq:* COMM 3220.
- COMM 3240 Communication, Sport and Society** 3 (3) Covers the cultural influence of communication about sports on society. Explores how communication enables cultural meanings and values to become associated and established within sports. Exposes students to the ways factors such as race, gender and nationalism manifest and perpetuate via communication about sports. *Preq:* COMM 2010 with a C or better.
- COMM 3250 Survey of Sports Communication** 3 (3) Covers fundamentals of communicating in a sports environment. Includes the basics of communicating for print and broadcast news, as well as communicating for sports information. Also covers ethical considerations in sports communications. *Preq:* COMM 2010 with a C or better.
- COMM 3260 Public Relations in Sports** 3 (3) Focuses on the preparation of professional sports communication materials for both internal and external audiences. Topics include the mechanics of creating press releases and other materials, as well as techniques in managing crises. *Preq:* COMM 2010 with a C or better.
- COMM 3270 Sports Media Criticism** 3 (3) Students gain in-depth understanding of sports communication issues through critically analyzing actual media coverage of sporting events, addressing social issues involved in college and professional sports, and developing an understanding of sports promotion and advertising. *Preq:* COMM 2010 with a C or better.
- COMM 3300 Nonverbal Communication** 3 (3) Develops a knowledge of the functions of nonverbal behaviors in human interaction. This includes the study of gesture and movement, physical appearance, vocal behavior, immediacy, time and space, and intercultural differences. Promotes understanding of nonverbal rules. *Preq:* COMM 2010 with a C or better.
- COMM 3480 Interpersonal Communication** 3 (3) Survey of the theories and research in interpersonal communication with emphasis on the application of research findings and developmental strategies for intra- and intercultural relationships. *Preq:* COMM 2010 with a C or better.
- COMM 3500 Small Group and Team Communication** 3 (3) Examines the principles and skills involved in effective small-group communication. *Preq:* COMM 2010 with a C or better.
- COMM 3550 Principles of Public Relations** 3 (3) Students learn the principles, theories, process, history and contexts of public relations. *Preq:* COMM 2010 with a C or better.
- COMM 3560 Stakeholder Communication** 3 (3) Focuses on external stakeholders such as the media, the community, and the government. Students learn theory- and research-based communication tactics to manage various stakeholder relationships. *Preq:* COMM 3550.
- COMM 3610 Argumentation and Debate** 3 (3) Basic principles of argumentation with emphasis on developing skills in argumentative speech. The role of the advocate in contemporary society with an emphasis on and an appreciation of formal debate. *Preq:* COMM 2500.
- COMM 3620 Communication and Conflict Management** 3 (3) Introduces the study of communication practices in conflict situations within various personal and professional settings. Emphasis is on the central role of communication in the understanding and management of conflict. *Preq:* COMM 2010 with a C or better.
- COMM 3640 Organizational Communication** 3 (3) Examination of the process, theories, and techniques of communications within small groups and other organized bodies. *Preq:* COMM 2010 with a C or better.
- COMM 3660 Special Topics in Communication Studies** 3 (3) Consideration of select major areas of practice in the field with a focus on application of communication concepts. May be repeated for a maximum of nine credits, but only if different topics are covered.
- COMM 3680 Applied Communication** 3 (3) Students apply and develop practical knowledge and skills relevant to specific research areas in communication studies as determined by instructor. Areas may include organizational, health, media and technological communication. *Preq:* COMM 2010 with a C or better; and COMM 3060 or 3100 or 3110, each with a C or better.
- COMM 3690 Political Communication** 3 (3) Examination of American political rhetoric after 1900, focusing on such notable speakers as Franklin D. Roosevelt, John F. Kennedy, and Martin Luther King Jr. *Preq:* COMM 2010 with a C or better.
- COMM 3900 Communication Studies Internship** 3 (9) Preplanned, preapproved, faculty-supervised internship provides Communication Studies majors with field experience in areas related to their curriculum. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Junior standing and consent of faculty advisor.
- COMM 3990 Creative Inquiry in Communication Studies** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue small group work on a particular research topic or practical problem. Arrangements with mentors must be established prior to registration. Content varies. May be repeated for a maximum of nine credits. *Preq:* COMM 2010 with a C or better.
- COMM 4000 Communication and Globalization** 3 (3) In-depth examination of the role communication plays in globalization processes, including case studies of contemporary social, technical, professional and ethical issues. *Preq:* COMM 2010 with a C or better.
- COMM 4020 Mass Communication: History and Criticism** 3 (3) Critical examination of mass communication in America, including discussions of history, theory, and current issues in television, film, popular music, telecommunications, and other media. *Preq:* COMM 2010 with a C or better.
- COMM 4040\* Media Communication and Social Identities** 3 (3) Examines the communication of individual and social identities in convergent and mass/social media, and popular culture. Focuses on the communication of identity portrayals and representations, communicative acts in response, and how individuals and groups navigate and create their own media cultures. Addresses factors such as ability, faith, gender, race, age, nationality, subcultures, and/or other areas. *Preq:* COMM 2010 with a C or better.

- COMM 4050 Public Contest and Change 3 (3)** Examines the role of public communication in the process of contesting social values and practices and in the subsequent change that sometimes occurs. Students explore the public's relationship with mass media as well as other forms of communication practices that can produce cultural change. *Preq:* COMM 2010 with a C or better and COMM 3050.
- COMM 4250 Advanced Sports Communication 3 (3)** Combination seminar and primary research class that explores contemporary sports communication issues. Students write position papers on seminar topics and conduct primary research on sports communication topics of their choice. *Preq:* COMM 3250.
- COMM 4260 Social Media and Sports Communication 3 (3)** Covers the influence of communication and social media in sports and how these technologies are changing the communicative infrastructure of sports. Students explore how social media is re-configuring sports media, how sports organizations are managing social media, and how social media affects fan behavior and athlete communication. *Preq:* COMM 2010 with a C or better.
- COMM 4270 Communication in Sports Organizations 3 (3)** Examines communication dynamics in sports organizations. Among others, topics may include identifying how sports organizations manage crisis communication, communication with stakeholders, sexual harassment, ethical issues, and dissent. *Preq:* COMM 2010 with a C or better.
- COMM 4280 Interpersonal/Family Communication and Sport 3 (3)** Examines how communication functions in interpersonal and family contexts as it pertains to sports. Exposes students to positive and negative communicative behavior with athletes, coaches and families. Challenges students to identify ways that sports can be a healthy, rather than destructive, communicative topic for families and interpersonal relationships. *Preq:* COMM 2010 with a C or better.
- COMM 4300 Legal Communication 3 (3)** Explores the theory and practice of communication in the legal setting, including the trial and appeal processes. Emphasizes the importance of effective communication in the legal profession.
- COMM 4310 Legal Communication Trial 3 (3)** Advanced study in communication and the law, legal analysis and the elements of trial preparation, including out of court preparation, jury selection, limited motion practice, opening statements, direct examination and cross examination of witnesses, closing arguments, and jury charges. May be repeated for a maximum of nine credits. *Preq:* COMM 4300.
- COMM 4510\* Film Theory and Criticism 3 (2)** Advanced study into the theory of film/video making emphasizing understanding a variety of critical methods to approach a film. Examines the history of film theory and defines the many schools of film criticism, including realism, formalism, feminism, semiotics, Marxism, and expressionism. May also be offered as ENGL 4510. *Preq:* ENGL 3570. *Coreq:* COMM 4511.
- COMM 4511\* Film Theory and Criticism Laboratory 0 (3)** Non-credit laboratory to accompany COMM 4510. May also be offered as ENGL 4511. *Coreq:* COMM 4510.
- COMM 4550 Gender Communication 3 (3)** Explores the ways communication behavior and perceptions of communication behavior are affected by gender. The effects of gender on a variety of communication contexts are examined, including interpersonal, small group, organizational, and mass communication. *Preq:* COMM 2010 with a C or better.
- COMM 4560 Strategic Communication for Social Change 3 (3)** In-depth examination and application of the strategic use of communication for creating social change. *Preq:* COMM 3100 or COMM 3110; and COMM 3560.
- COMM 4620 Communication and Negotiation 3 (3)** Building on the concepts and practices of conflict management, students develop knowledge and skills for distributive bargaining and integrative negotiation climates. Focuses on the objectives, goals, positions, interests, tactic, and other elements to negotiate successfully in a variety of situations. *Preq:* COMM 3620.
- COMM 4640\* Advanced Organizational Communication 3 (3)** Application of communication theory and research to the analysis of particular organizational communication processes. Students study significant issues and/or methods of intervention and innovation in organizational communication. *Preq:* COMM 3640.
- COMM 4660 Advanced Special Topics in Communication Studies 3 (3)** Consideration of specialized areas of study in the field, emphasizing theoretical depth or extensive research. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Junior or senior standing.
- COMM 4700\* Communication and Health 3 (3)** Considers institutional and health care communication issues as well as the relationship between social issues, communication, and health. *Preq:* COMM 2010 with a C or better.
- COMM 4800 Intercultural Communication 3 (3)** Introduces the process of communication between and among individuals from different cultures or subcultures. Emphasizes the effect of cultural practices within various communication relational contexts such as interpersonal, small group, and organizational communication. *Preq:* COMM 2010 with a C or better.
- COMM 4910\* Classical Rhetoric 3 (3)** Traces the development of rhetoric from Protagoras through Isocrates, Plato, Aristotle, Cicero and Quintillian and considers questions essential to understanding persuasive theory and practices. May also be offered as ENGL 4910. *Preq:* ENGL 3100.
- COMM 4920\* Modern Rhetoric 3 (3)** Examines the new rhetorics of the 20th century, which are grounded in classical rhetoric but include findings from biology, psychology, linguistics and anthropology, among other disciplines. May also be offered as ENGL 4920. *Preq:* ENGL 3100.
- COMM 4950 Senior Capstone Seminar 3 (3)** In-depth exploration and analysis of a special topic in Communication Studies, culminating in a senior project documented in written, oral, visual and/or multimedia presentations. Topics vary based on faculty expertise and research interests. May be repeated for a maximum of six credits. *Preq:* Senior standing in Communication Studies and one of the following courses with a C or better: COMM 3010 or COMM 3020 or COMM 3150.
- COMM 4960 Honors Creative Inquiry Capstone 3 (3)** Capstone course for honors students in the department's creative inquiry sequence. Working with their departmental honors advisor, students apply theoretical understanding and research skills in completing a written product of conference or publication length/quality. Must be taken for a total of six credits over the course of two semesters. *Preq:* Two of the following courses with a C or better in each: COMM 3060 or COMM 3100 or COMM 3110; and Senior standing in Communication Studies.
- COMM 4980 Communication Academic and Professional Development II 1 (1)** Students reflect upon curricular relationships among general education, major, and minor courses. They complete and revise digital portfolios for presentation to the major, University, graduate schools, or potential employers. Students participate in resumé building, job seeking, and interviewing activities. *Preq or concurrent enrollment:* COMM 4950 or COMM 4960.
- COMM 4990 Independent Study 1-3 (1-3)** Tutorial work for students with special interests or projects in communication studies outside the scope of existing courses. May be repeated for a maximum of nine credits. *Preq:* Consent of department chair.

## COMPUTER SCIENCE

*Professors:* A.W. Apon, *Computer Science Chair*; A.T. Duchowski, R.M. Geist III, *Interim Director*; J.E. Gilbert, *Human-Centered Computing Chair*; S.M. Hedetniemi, L.F. Hodges, D.H. House, *Visual Computing Chair*; M. Sitaraman, P.K. Srimani, J.A. Tessendorf; *Associate Professors:* T.A. Davis, B.C. Dean, W.D. Goddard, J.O. Hallstrom, F. Luo, B.A. Malloy, J.J. Martin, J.D. McGregor, R.P. Pargas, M.K. Smotherman, Z. Wang, D.L. Woodard; *Assistant Professors:* S.V. Babu, K.E. Caine, S.B. Daily, C.M. Gardner-McCune, C.S. Joerg, J.A. Levine, K.A. McMullen, S.L. Remy, I.M. Safro, J. Sorber; *Adjunct Professors:* V. Burton, S.J. Stuart, P. Wilson; *Adjunct Associate Professor:* N. Sridhar; *Adjunct Assistant Professor:* C.A. Zambaka; *Research Professors:* J. Taiber, J.M. Westall; *Research Associate Professor:* J.B. Gemmill; *Senior Lecturers:* C. Hocrhine, R.M. Lowe, *Lecturers:* J.H. Jones, R.S. Lambert, P.D. Sterling, K.A. Weaver

**CPSC 1010 Computer Science I 4 (3)** Introduction to modern problem solving and programming methods. Special emphasis is placed on algorithm development and software life cycle concepts. Includes use of appropriate tools and discusses ethical issues arising from the impact of computing upon society. Intended for students concentrating in computer science or related fields. Includes Honors sections. *Preq:* MATH 1050. *Coreq:* CPSC 1011. Students who have not completed MATH 1050, but who score a satisfactory score on the Clemson Mathematics Placement Test, may request a registration override from the instructor.



- CPSC 1011 Computer Science I Laboratory 0 (2)**  
Non-credit laboratory to accompany CPSC 1010.  
*Coreq:* CPSC 1010.
- CPSC 1020 Computer Science II 4 (3)** Continuation of CPSC 1010. Continued emphasis on problem solving and program development techniques. Examines typical numerical, nonnumerical, and data processing problems. Introduces basic data structures. Credit may not be received for both CPSC 1020 and 2100. Includes Honors sections. *Preq:* CPSC 1010 with a C or better. *Coreq:* CPSC 1021.
- CPSC 1021 Computer Science II Laboratory 0 (2)**  
Non-credit laboratory to accompany CPSC 1020.  
*Coreq:* CPSC 1020.
- CPSC 1040 Introduction to the Concepts and Logic of Computer Programming 2 (1)** Introduction to the concepts and logic of computer programming. Simple models are used to introduce basic techniques for developing a programmed solution to a given problem. Problem solving techniques are considered. Not open to students who have received credit for CPSC 1010, CPSC 1110, CPSC 1570, or CPSC 2100. *Coreq:* CPSC 1041.
- CPSC 1041 Introduction to the Concepts and Logic of Computer Programming Laboratory 0 (2)**  
Non-credit laboratory to accompany CPSC 1040.  
*Coreq:* CPSC 1040.
- CPSC 1110 Introduction to Programming in C 3 (2)**  
Introduction to computer programming in C and its use in solving problems. Intended primarily for technical majors. Basic instruction in programming techniques, algorithms and standard Unix software development tools and utilities. Credit may not be received for both CPSC 1010 and CPSC 1110.  
*Coreq:* CPSC 1111.
- CPSC 1111 Introduction to Programming in C Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 1110. *Coreq:* CPSC 1110.
- CPSC 1150 Introduction to Computational Science 3 (3)** Introduction to systems thinking. Includes development of dynamical systems models using visual modeling tools and development of dynamical systems using agent based software. Class material investigates elementary science and engineering models.
- CPSC 1200 Introduction to Information Technology 3 (2)** Investigation of ethical and societal issues based on the expanding integration of computers into our everyday lives. Considers historical background, terminology, new technologies and the projected future of computers. Includes practical experience with common computer software technologies. Will not satisfy Computer Science Requirements in any Computer Science major. *Coreq:* CPSC 1201.
- CPSC 1201 Introduction to Information Technology Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 1200. *Coreq:* CPSC 1200.
- CPSC 1610 Introduction to Visual Basic Programming 3 (2)** Introduction to programming using the Visual Basic language. Topics include simple and complex data types, arithmetic operations, control flow, files, and database programming. Several projects are implemented during the semester. *Coreq:* CPSC 1611.
- CPSC 1611 Introduction to Visual Basic Programming Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 1610. *Coreq:* CPSC 1610.
- CPSC 1990 Creative Inquiry in Computing 1-3 (1-3)** Students engage in faculty-led research in the context of a team effort. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.
- CPSC 2070 Discrete Structures for Computing 3 (3)** Introduces ideas and techniques from discrete structures that are widely used in the computing sciences. Topics emphasize techniques of rigorous argumentation and application to the computing disciplines. *Preq:* CPSC 1010 or CPSC 1110; and MATH 1020 or MATH 1060.
- CPSC 2100 Programming Methodology 4 (3)** Introduction to programming techniques and methodology. Topics include structured programming, stepwise refinement, program design and implementation techniques, modularization criteria, program testing and verification, basic data structures, and analysis of algorithms. Credit may not be received for both CPSC 1020 and 2100. *Preq:* CPSC 1110 and satisfactory performance on a pretest. *Coreq:* CPSC 2101.
- CPSC 2101 Programming Methodology Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 2100. *Coreq:* CPSC 2100.
- CPSC 2120 Algorithms and Data Structures 4 (3)** Study of data structures and algorithms fundamental to computer science; abstract data-type concepts; measures of program running time and time complexity; algorithm analysis and design techniques. *Preq:* CPSC 1020 with a C or better or CPSC 2100 with a C or better. *Coreq:* CPSC 2121.
- CPSC 2121 Algorithms and Data Structures Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 2120. *Coreq:* CPSC 2120.
- CPSC 2150 Software Development Foundations 3 (2)** Intensive study of software development foundations. Advanced coverage of programming language primitives, function-level design principles, and standard development and debugging tools. Introductory coverage of module-level design principles, program specification and reasoning principles, and validation and verification techniques. *Preq:* CPSC 1020 with a C or better or 2100 with a C or better. *Coreq:* CPSC 2151.
- CPSC 2151 Software Development Foundations Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 2150. *Coreq:* CPSC 2150.
- CPSC 2200 Microcomputer Applications 3 (3)** Applications of microcomputers to formulate and solve problem models. Emphasizes applications development in database and spreadsheet environments. Current software products are used. Students are expected to have experience with word processing and spreadsheet applications.
- CPSC 2310 Introduction to Computer Organization 4 (3)** Study of the machine architectures on which algorithms are implemented and requirements of architectures that support high-level languages, programming environments, and applications. *Preq:* CPSC 1020 with a C or better or 2100 with a C or better. *Coreq:* CPSC 2311.
- CPSC 2311 Introduction to Computer Organization Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 2310. *Coreq:* CPSC 2310.
- CPSC 2810 Selected Topics in Computer Science 1-4 (1-4)** Areas of computer science in which new trends arise. Innovative approaches to a variety of problems in the use and understanding of basic computing concepts are developed and implemented. May be repeated for a maximum of eight credits, but only if different topics are covered.
- CPSC 2910 Seminar in Professional Issues I 1 (1)**  
Considers the impact of computer use on society. Discusses ethical use of software and protection of intellectual property rights. Profession is viewed historically; organizations important to the profession are discussed; the development process for standards is presented; and students are introduced to the professional literature. *Preq:* CPSC 1020 or CPSC 2100.
- CPSC 3220 Introduction to Operating Systems 3 (3)** Detailed study of management techniques for the control of computer hardware resources. Topics include interrupt systems, primitive level characteristics of hardware and the management of memory, processor, devices, and data. May also be offered as ECE 3220 *Preq:* CPSC 2120 and CPSC 2310, each with a C or better; or ECE 2230 and ECE 2720, each with a C or better.
- CPSC 3300 Computer Systems Organization 3 (3)** Introduction to the structure of computer systems. Various hardware/software configurations are explored and presented as integrated systems. Topics include digital logic, basic computer organization, computer arithmetic, memory organization, input/output organizations, interrupt processing, multi-processors, and cluster computers. *Preq:* CPSC 2120 and CPSC 2310, each with a C or better.
- CPSC 3500 Foundations of Computer Science 3 (3)** Development of the theoretical foundations of programming, algorithms, languages, automata, computability, complexity, data structures, and operating systems; a broad range of fundamental topics is consolidated and extended in preparation for further study. *Preq:* CPSC 2070 and CPSC 2120 each with a C or better.
- CPSC 3520 Programming Systems 3 (3)** Second course in programming languages and systems. Topics include assemblers, compilers, and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. May also be offered as ECE 3520. *Preq:* ECE 2230; or CPSC 2120 and CPSC 2150. *Preq or concurrent enrollment:* CPSC 2070 or MATH 4190.
- CPSC 3600 Networks and Network Programming 3 (3)** Introduction to basic concepts of computer network technologies and network programming. Topics include network programming, layered protocol architectures, local and wide area networks, internetwork and intranetwork concepts, security. Socket level programming is introduced and used throughout the course. *Preq:* CPSC 2120 and CPSC 2150, each with a C or better.
- CPSC 3620 Distributed and Cluster Computing 3 (3)** Introduction to the basic technology of and programming techniques for distributed and cluster computing. Standard techniques for developing parallel solutions to problems are introduced and implemented. Software systems that provide high-level abstractions for data communications are considered. *Preq:* CPSC 3600 with a C or better.

- CPSC 3710 Systems Analysis 3 (3)** Incorporates a study of the decision-making process at all levels with the logical design of information systems. Extensive study of the system life cycle with emphasis on current as well as classical techniques for describing data flows, data structures, file design, etc. *Preq:* CPSC 3600.
- CPSC 3720 Introduction to Software Engineering 3 (3)** Intensive introduction to software engineering. Focuses on each major phase of the software lifecycle. Introductory coverage of requirements analysis, requirements modeling, design modeling, and project management. Intermediate coverage of module-level design principles, program specification and reasoning principles, and program validation and verification techniques. *Preq:* CPSC 2120 and CPSC 2150, each with a C or better.
- CPSC 3950 Honors Seminar 1 (1)** Research topics in various areas of computer science are presented. Methods for identifying and initiating research projects are considered. May be repeated for a maximum of two credits. *Preq:* Admission to Departmental Honors Program.
- CPSC 3990 Advanced Creative Inquiry in Computing 1-3 (1-3)** Upper-division students engage in faculty-led research in the context of a team effort. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of instructor.
- CPSC 4040\* Computer Graphics Images 3 (3)** Presents the theory and practice behind the generation and manipulation of two-dimensional digital images within a computer graphics context. Image representation and storage, sampling and reconstruction, color systems, affine and general warps, enhancement and morphology, compositing, morphing, and non-photorealistic transformations. *Preq:* CPSC 2120 and MATH 3110; or DPA 4010.
- CPSC 4050\* Computer Graphics 3 (3)** Computational, mathematical, physical and perceptual principles underlying the production of effective three-dimensional computer graphics imagery. *Preq:* CPSC 2120 and MATH 3110; or DPA 4010.
- CPSC 4060\* General Purpose Computation on Graphical Processing Units 3 (3)** Instruction in the design and implementation of highly parallel, GPU-based solutions to computationally intensive problems from a variety of disciplines. The OpenCL language with inter-operable OpenGL components is used. Applications to models of physical systems are discussed in detail. *Preq:* CPSC 2120 and MATH 2060.
- CPSC 4110\* Virtual Reality Systems 3 (3)** Design and implementation of software systems necessary to create virtual environments. Discusses techniques for achieving real-time, dynamic display of photorealistic, synthetic images. Includes hands-on experience with electromagnetically-tracked, head-mounted displays and requires, as a final project, the design and construction of a virtual environment. *Preq:* CPSC 2120 and 2150, each with a C or better.
- CPSC 4120\* Eye Tracking Methodology and Applications 3 (3)** Introduction to the human visual system; visual perception; eye movements; eye tracking systems and applications in psychology, industrial engineering, marketing, and computer science; hands-on experience with real time, corneal-reflection eye trackers, experimental issues. Final project requires the execution and analysis of an eye tracking experiment. *Preq:* CPSC 2120 or MKT 4310 or PSYC 3100.
- CPSC 4140\* Human and Computer Interaction 3 (3)** Survey of human and computer interaction, its literature, history, and techniques. Covers cognitive and social models and limitations, hardware and software interface components, design methods, support for design, and evaluation methods. *Preq:* CPSC 2120 and 2150, each with a C or better.
- CPSC 4160\* 2-D Game Engine Construction 3 (3)** Introduction to tools and techniques necessary to build 2-D games. Techniques draw from subject areas such as software engineering, algorithms, and artificial intelligence. Students employ techniques such as sprite animation, parallax scrolling, sound, AI incorporated into game sprites, and the construction of a game shell. *Preq:* CPSC 2120 and 2150, each with a C or better.
- CPSC 4200\* Computer Security Principles 3 (3)** Covers principles of information systems security, including security policies, cryptography, authentication, access control mechanisms, system evaluation models, auditing, and intrusion detection. Computer security system case studies are analyzed. *Preq:* CPSC 3220 or ECE 3220; and 3600, each with a C or better.
- CPSC 4240\* System Administration and Security 3 (3)** Covers topics related to the administration and security of computer systems. Primary emphasis is on the administration and security of contemporary operating systems. *Preq:* CPSC 3220 or ECE 3220; and 3600, each with a C or better.
- CPSC 4280\* Design and Implementation of Programming Languages 3 (3)** Overview of programming language structures and features and their implementation. Control and data structures found in various languages are studied. Also includes runtime organization and environment and implementation models. *Preq:* CPSC 2310 and 3500, each with a C or better.
- CPSC 4550\* Computational Science 3 (3)** Introduction to the methods and problems of computational science. Uses problems from engineering and science to develop mathematical and computational solutions. Case studies use techniques from Grand Challenge problems. Emphasizes the use of networking, group development, and modern programming environments. *Preq:* MATH 1080 and MATH 3110. Students are expected to have previous programming experience in a higher level language.
- CPSC 4620\* Database Management Systems 3 (3)** Introduction to database/data communications concepts as related to the design of online information systems. Problems involving structuring, creating, maintaining, and accessing multiple-user databases are presented and solutions developed. Comparison of several commercially available teleprocessing monitor and database management systems is made. Includes Honors sections *Preq:* CPSC 2120 and CPSC 2150, each with a C or better.
- CPSC 4630\* On-line Systems 3 (3)** In-depth study of the design and implementation of transaction processing systems and an introduction to basic communications concepts. A survey of commercially available software and a project using one of the systems are included. *Preq:* CPSC 4620.
- CPSC 4720\* Software Development Methodology 3 (3)** Advanced topics in software development methodology. Techniques such as chief programmer teams, structured design and structured walkthroughs are discussed and used in a major project. Emphasizes the application of these techniques to large-scale software implementation projects. Also includes additional topics such as mathematical foundations of structured programming and verification techniques. Includes Honors sections. *Preq:* CPSC 3720 with a C or better.
- CPSC 4810\* Selected Topics 1-3 (1-3)** Areas of computer science in which nonstandard problems arise. Innovative approaches to problem solutions which draw from a variety of support courses are developed and implemented. Emphasizes independent study and projects. May be repeated for a maximum of six credits, but only if different topics are covered. Includes Honors sections.
- CPSC 4820\* Special Topics in Computing 3 (3)** In-depth treatment of topics not fully covered in regular courses. Topics vary from semester to semester. May be repeated, but only if different topics are covered.
- CPSC 4910 Seminar in Professional Issues II 3 (2)** Considers the impact of computing system development on society. Discusses ethical issues in the design and development of computer software. Students discuss standards for professional behavior, the professional's responsibility to the profession, and techniques for maintaining currency in a dynamic field. *Preq:* Senior standing. *Coreq:* CPSC 4911.
- CPSC 4911 Seminar in Professional Issues II Laboratory 0 (2)** Non-credit laboratory to accompany CPSC 4910. *Coreq:* CPSC 4910.
- CPSC 4950 Senior Thesis Research (Honors) 1-3 (1-3)** Directed individual research project for honors students supervised by departmental faculty. May be repeated for a maximum of six credits. *Preq:* Senior standing.

## CITY AND REGIONAL PLANNING

*Professors:* M. Lauria, T. Schurch; *Associate Professors:* M. Cunningham, C. Dyckman, C. Ellis, *Interim Chair;* *Assistant Professor:* E. Morris; *Senior Lecturer:* S. Sperry; *Lecturer:* T. Green; *Adjunct Professor:* B. Nocks

**CRP 4010\* Introduction to City and Regional Planning 3 (3)** Introduces students from other disciplines to city and regional planning. Spatial and nonspatial areas of the discipline are explored through a wide ranging lecture/seminar program. *Preq:* Consent of instructor.

**CRP 4030\* Seminar on Planning Communication 3 (3)** In-depth analysis of methods to communicate planning and policy decisions effectively. Familiarizes students with the various communication skills needed by planners, policy makers, and other professionals to become successful practitioners. *Preq:* Consent of instructor.

**CRP 4120\* Urban Transportation Planning** 3 (3) Consideration of urban travel characteristics, characteristics of transportation systems, transportation and land-use studies, trip distribution and trip assignment models, city patterns and subdivision layout. May also be offered as CE 4120. *Preq:* CE 3110.

**CRP 4300\* The Nature of Geographic Information Systems (GIS)** 3 (2) Introduction to the theory and practical use of Geographic Information Systems (GIS). The course emphasizes geographic and statistical information and how it is represented and analyzed with computers. It introduces the concepts and components of a GIS and how they affect societal issues. *Coreq:* CRP 4301.

**CRP 4301\* The Nature of Geographic Information Systems (GIS) Laboratory** 0 (3) Non-credit laboratory to accompany CRP 4300. *Coreq:* CRP 4300.

## CONSTRUCTION SCIENCE AND MANAGEMENT

*Professors:* D.C. Bausman, S. N. Clarke, R.W. Liska, C.A. Piper; *Assistant Professors:* J.M. Burgett, J.D. Lucas, J.P. Smith; *Senior Lecturer:* J.A. Wintz

**CSM 1000 Introduction to Construction Science and Management** 3 (3) Introduction to the construction industry and the Construction Science and Management Department. *Preq:* Construction Science and Management major.

**CSM 1500 Construction Problem Solving** 3 (3) Fundamentals and application of formal problem solving, critical thinking and ethics. *Preq:* CSM 1000 and Construction Science and Management major.

**CSM 2010 Structures I** 3 (3) Study of statically determinate structural components and systems, including force applications and distributions in structural elements and the resulting stress-strain patterns in axial, shear, and bearing mechanisms. *Preq:* MATH 1020 or MATH 1060; and PHYS 2070 and PHYS 2090; and Construction Science and Management or Architecture major.

**CSM 2020 Structures II** 4 (3) Study of force distribution and behavior in statically determinate structural components and systems; analysis and design of basic reinforced concrete, steel, wood, and formwork components and systems, including shear and moment stress, combined loading/stress conditions, and deflections. *Preq:* CSM 2010; and Construction Science and Management or Architecture major. *Coreq:* CSM 2021.

**CSM 2021 Structures II Laboratory** 0 (2) Non-credit laboratory to accompany CSM 2020. *Coreq:* CSM 2020.

**CSM 2030 Materials and Methods of Construction I** 3 (3) Descriptive study of the materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of wood, masonry, residential interior and exterior finishes, and building foundations. *Preq:* Construction Science and Management or Architecture major. *Preq or concurrent enrollment:* AAH 2100 and CSM 1000 (Architecture majors do not need the preq courses, but must request a registration override from the instructor).

**CSM 2040 Contract Documents** 3 (2) Introduction to working drawings, specifications, and the various documents required to carry out a typical construction project. *Preq:* Construction Science and Management major, or consent of department chair. *Coreq:* CSM 2041 and CSM 2050.

**CSM 2041 Contract Documents Laboratory** 0 (3) Non-credit laboratory to accompany CSM 2040. *Coreq:* CSM 2040.

**CSM 2050 Materials and Methods of Construction II** 3 (3) Descriptive study of materials and methods of construction, focusing on nomenclature, building materials, and assembly of building systems consisting primarily of steel and concrete, in addition to roofing assemblies and interior and exterior commercial finishes. *Preq:* CSM 2030; and Construction Science and Management or Architecture major. *Coreq:* CSM 2040.

**CSM 3030 Soils and Foundations** 3 (2) Study of various types of soils and foundations, including soil testing, reports, compaction, stability, and function, as they relate to the construction process. *Preq:* CSM 2020, and Construction Science and Management major. *Coreq:* CSM 3031.

**CSM 3031 Soils and Foundations Laboratory** 0 (3) Non-credit laboratory to accompany CSM 3030. *Coreq:* CSM 3030.

**CSM 3040 Environmental Systems I** 3 (3) Theory and practice of heating, ventilating, air conditioning, and plumbing systems for buildings. *Preq:* CSM 2050 and PHYS 2080 and PHYS 2100, and Construction Science and Management or Architecture major.

**CSM 3050 Environmental Systems II** 3 (3) Theory and practice of fire protection, specialty piping, lighting, and electrical systems for buildings. *Preq:* CSM 3040 and Construction Science and Management or Architecture major.

**CSM 3510 Construction Estimating** 3 (2) Study of basic estimating as applied to construction projects. Includes the take-off of material quantities, assigning labor and equipment production rates, and applying material prices, wage rates, and equipment costs to derive a total job cost. *Preq:* CSM 2040 and CSM 2050 and MGT 2180, all required MATH courses, Construction Science and Management major. *Preq or concurrent enrollment:* BE 3200 and CSM 3030. *Coreq:* CSM 3511.

**CSM 3511 Construction Estimating Laboratory** 0 (2) Non-credit laboratory to accompany CSM 3510. *Coreq:* CSM 3510.

**CSM 3520 Construction Scheduling** 3 (2) Analysis of construction projects emphasizing estimating, scheduling, and resource leveling. *Preq:* CSM 3510, Construction Science and Management major. *Preq or concurrent enrollment:* CSM 3040. *Coreq:* CSM 3521 and CSM 3530.

**CSM 3521 Construction Scheduling Laboratory** 0 (2) Non-credit laboratory to accompany CSM 3520. *Coreq:* CSM 3520.

**CSM 3530 Construction Estimating II** 3 (2) Continuation of basic construction estimating with the additional component of computerized estimating. Includes material, labor, and equipment costs, production rates, bid ethics, constructability analysis, and understanding of other types of estimating procedures. *Preq:* CSM 3510 and Construction Science and Management major. *Preq or concurrent enrollment:* CSM 3040. *Coreq:* CSM 3520 and CSM 3531.

**CSM 3531 Construction Estimating II Laboratory** 0 (2) Non-credit laboratory to accompany CSM 3530. *Coreq:* CSM 3530.

**CSM 4110 Safety in Building Construction** 3 (3) Study of construction safety management and controls. *Preq:* Construction Science and Management major. *Coreq:* CSM 4530.

**CSM 4200 Highway Construction and Contracting** 3 (3) Study of contracting and construction of highways, including selection and use of equipment, construction of pavements, bridges, and drainage structures, and related processes. *Preq:* CSM 3030 and CSM 3520 and CSM 3530.

**CSM 4500 Construction Internship** 1 (1) Documentation of 8000 hours of approved experience in the construction industry with evaluation of student portfolio and preparation and sitting for the American Institute of Constructors CPC Level I examination. *Preq:* Consent of department chair.

**CSM 4530 Construction Project Management** 3 (3) Study of construction business organization, methods of project delivery, field organization, policy, ethics, project management, control systems, labor management relations, and productivity. *Preq:* CSM 3520 and CSM 3530, and Construction Science and Management major. *Preq or concurrent enrollment:* LAW 3220 and MGT 3070. *Coreq:* CSM 4110 and CSM 4610.

**CSM 4540 Construction Capstone** 6 (5) Students develop a capstone project that entails the knowledge obtained in all previous courses in the Construction Science and Management Program. Students must take the capstone course at Clemson University. *Preq:* CSM 4530 and Construction Science and Management major. *Coreq:* CSM 4541.

**CSM 4541 Construction Capstone Laboratory** 0 (3) Non-credit laboratory to accompany CSM 4540. *Coreq:* CSM 4540.

**CSM 4550\* Reducing Adversarial Relations in Construction** 3 (3) Focuses on the study of the delivery of projects and how adversarial relations can affect the successful completion of the venture. Topics include management of human resources, understanding the needs and processes of the participants, where problems lie, methods of avoiding and settling disputes. *Preq:* Construction Science and Management or Architecture major, and senior standing.

**CSM 4610 Construction Economics Seminar** 3 (3) Studies in the financial performance of construction companies. *Preq:* ACCT 2010 and ECON 2110 and ECON 2120, and Construction Science and Management major. *Coreq:* CSM 4530.

**CSM 4900 Directed Studies 1-3 (1-3)** Comprehensive studies and research of special topics not covered in other courses. Emphasizes field studies, research activities, and current developments in construction science. May be repeated for a maximum of six credits. Includes Honors sections. *Prq:* Consent of instructor.

**CSM 4980 Current Topics in Construction 1-3 (1-3)** Study of current topics in the construction industry not central to other construction science courses. Specific titles and course descriptions are announced for each semester. May be repeated for a maximum of six credits. *Prq:* Consent of department chair.

## CAREER AND TECHNOLOGY EDUCATION

*Professors:* W.L. Havice, W.D. Paige; *Associate Professor:* C.E. Poston; *Lecturer:* H.L. Harrison

**CTE 1150 Contemporary Technological Problems 3 (3)** Provides students with an understanding of the problems and contributions of technology. Examples are taken from historical accounts and from analyses of contemporary technological intervention both in industrialized and nonindustrialized countries.

**CTE 2210 Exploring Technology 3 (3)** Covers a wide range of technological concepts along with familiar examples of how technology impacts our lives as individuals, a society, and a global community.

**CTE 3100 Designing Creative Instruction 3 (2)** Provides preservice teachers with opportunities to develop skills in technological literacy, design, inquiry-based instruction, and problem solving using a variety of media, with emphasis on their applications in the elementary curriculum. *Prq:* Junior standing in Early Childhood or Elementary Education. *Coreq:* CTE 3101.

**CTE 3101 Designing Creative Instruction Laboratory 0 (2)** Non-credit laboratory to accompany CTE 3100. *Coreq:* CTE 3100.

## CLEMSON UNIVERSITY

**CU 1000 Clemson Connect 0 (0)** Introduction to the learning experience at Clemson University. Includes instruction in information technology and information skills. To be taken Pass/No Pass only.

**CU 1010 University Success Skills 2 (3)** Introduction to a variety of topics critical to students' success. Topics include time management, goal setting, test taking, campus resources and policies, critical thinking, and diversity. Students are given opportunities to discover and practice many procedures, techniques, and tips. Limited to freshmen and first semester transfer students.

**CU 1100 Introduction to Tutoring 1 (1)** Students develop and reinforce skills in tutoring and communication through use of techniques based in educational research. To be taken Pass/No Pass only.

**CU 1110 Introduction to Supplemental Instruction 1 (1)** Students develop and reinforce interpersonal relationship skills in listening, decision making, communicating, group dynamics, leadership, assertiveness, time management, problem solving, and conflict resolution. To be taken Pass/No Pass only.

**CU 1200 Introduction to Career Development 1 (1)** This course educates students about career planning, equips them to evaluate prospective career fields, and enables them to pursue career aspirations. Upon completion, students have a greater awareness of their career interests, and understand the connection between their studies and their career goals.

**CU 1970 New Student Seminar 1-3 (1-3)** Introduction to the university academic environment. Class meeting instruction focuses on discussion of a topic selected by a faculty member. Includes additional online and workshop instruction in information technology, global citizenship and academic success skills. To be taken Pass/No Pass only.

**CU 2010 Sustainability Leadership 3 (3)** Participants learn how principles of environmental, social and economic sustainability apply in contexts ranging from personal lifestyle choices, to the built environment, to operation of public and private institutions. Participants also develop and practice skills to act as agents of change in the university and the broader community.

## CARDIOVASCULAR TECHNOLOGY

*Lecturer:* E.J. Walker

**CVT 2250 Ultrasound Physics 3 (3)** Explanation of the basic principles and characteristics associated with diagnostic ultrasound. *Prq:* CVT 2260.

**CVT 2260 Introduction to Cardiovascular Sonography 3 (3)** Introduces students to patient care, patient confidentiality, blood components, lymphatics, cardiovascular pharmacology, heart embryology, cardiovascular anatomy and physiology, standard sonography views, and Doppler/instrumentation. *Prq or concurrent enrollment:* BIOL 2220.

**CVT 3250 Echocardiography Principles 4 (3)** Study of two-dimensional, m-mode, Doppler echocardiography and left ventricular systolic function. Includes discussion of various pathologies, the resulting echocardiographic findings and treatments. *Prq:* CVT 2250 and CVT 2260. *Coreq:* CVT 3251.

**CVT 3251 Echocardiography Principles Laboratory 0 (2)** Non-credit laboratory to accompany CVT 3250. *Coreq:* CVT 3250.

**CVT 3260 Echocardiography Methods 4 (3)** Study of two-dimensional, Doppler echocardiography and transesophageal echocardiography. Includes discussion of various pathologies, the resulting echocardiographic findings and treatments. *Prq:* CVT 3250. *Coreq:* CVT 3261.

**CVT 3261 Echocardiography Methods Laboratory 0 (2)** Non-credit laboratory to accompany CVT 3260. *Coreq:* CVT 3260.

**CVT 3350 Vascular Sonography Principles 4 (3)** Study of two-dimensional, color Doppler, spectral Doppler and other testing modalities in peripheral and cerebrovascular disease. Includes discussion of various pathologies, the resulting sonographic findings and treatments. *Prq:* CVT 2260. *Coreq:* CVT 3351.

**CVT 3351 Vascular Sonography Principles Laboratory 0 (2)** Non-credit laboratory to accompany CVT 3350. *Coreq:* CVT 3350.

**CVT 3360 Vascular Sonography Methods 4 (3)** Study of two-dimensional, color Doppler, spectral Doppler and other testing modalities in peripheral arterial, abdominal vascular and intracranial cerebrovascular disease. Includes discussion of various pathologies, the resulting sonographic findings and treatments. *Prq:* CVT 3350. *Coreq:* CVT 3361.

**CVT 3361 Vascular Sonography Methods Laboratory 0 (2)** Non-credit laboratory to accompany CVT 3360. *Coreq:* CVT 3360.

**CVT 4240 CVT Introduction to Field Experience 3 (18)** Students complete 4400 hours of uninterrupted, supervised work in a clinical care setting. Under direct supervision of GHS registered sonographers, students are introduced to scanning protocols and techniques, instructed in principles, techniques and applications of multiple diagnostic modalities, including echocardiography, vascular duplex imaging, Doppler, and plethysmography. *Prq:* CVT 3260 and 3360.

**CVT 4250 CVS Field Experience II 6 (18)** Intermediate level course expands on introductory skills learned in CVT 4240. Students apply scanning protocols and techniques, and improve their use of multiple diagnostic modalities, including echocardiography, vascular duplex imaging, Doppler, and plethysmography. Students become proficient with all aspects of paperwork and communications within the health care organization. *Prq:* CVT 4240.

**CVT 4260 CVS Field Experience III 6 (18)** In this advanced course, students complete 440 hours in a clinical setting under the supervision of registered sonographers. Students are tested in all aspects of fundamental principles, techniques and applications of multiple diagnostic modalities, including echocardiography, vascular duplex imaging, Doppler and plethysmography. *Prq:* CVT 4250.

## DANCE

*Lecturer:* C.L. Hosler

**DANC 1300 Tap Dance I 1 (3)** Introduces fundamentals and vocabulary of tap dancing with opportunities to develop rhythmic patterns of various origins. Applied dance fee is assessed.

**DANC 1400 Jazz Dance I 1 (3)** Introduces basic principles and fundamentals of jazz technique and explores flexibility and strength-building exercises. Applied dance fee is assessed.

**DANC 1500 Modern Dance I 1 (3)** Introduces basic principles of dance movement and vocabulary, and actively explores and applies different methods of body alignment and theory. Applied dance fee is assessed.

**DANC 1600 Ballet Dance I 1 (3)** Introduces basic principles and fundamentals of classical ballet, with emphasis on good technique, center work, and across the floor work. Applied dance fee is assessed.

**DANC 3300 University Dance Company 1 (3)** Performance ensemble for advanced dance students. Provides opportunities to learn and develop choreographic skills as well as to improve personal dance techniques. Company is selected by audition. May include public recital(s). Applied dance fee is assessed.

## DIGITAL PRODUCTION ARTS

*Professors:* A.T. Duchowski, R.M. Geist III, D.H. House, J.A. Tessendorf, *Director*; *Associate Professors:* T.A. Davis, D.S. Donar, B.A. Malloy, A.M. Penna; *Assistant Professors:* S. Joerg, J. Levine; *Lecturer:* L.J. House

### DPA 3070 Studio Methods for Digital Production

3 (1) Exposes students to current studio practice in the development of 3-D computer graphics and animation for film, electronic games, and visualization. Topics include modeling, rigging, animation, texturing, lighting, rendering, compositing and editing. Open source tools are used so methods are transportable to most computing environments. *Coreq:* DPA 3071.

### DPA 3071 Studio Methods for Digital Production

Laboratory 0 (4) Non-credit laboratory to accompany DPA 3070. *Coreq:* DPA 3070.

### DPA 4000\* Technical Foundations of Digital

Production I 3 (3) The technical, conceptual, and algorithmic foundations of computer graphics. Covers the Unix operating system, scripting, C programming, and an interactive graphics API. Not open to Computer Engineering, Computer Information Systems or Computer Science majors.

### DPA 4010\* Technical Foundations of Digital

Production II 3 (3) The mathematical and algorithmic foundations of computer graphics. Covers spatial data structures, object oriented programming in C++, mathematics for graphics, and 3-D graphics API. *Preq:* DPA 4000. Not open to Computer Science, Computer Engineering, or Computer Information Systems majors.

### DPA 4020\* Visual Foundations of Digital

Production I 3 (6) Presents the visual foundations underlying computer graphics production. Covers perspective, observational drawing, color and value, principles of composition and design, and storyboarding. Incorporates the studio method, involves students in hands-on work and the critique process, and stresses examples from the history of art, animation and film. Not open to Architecture or Visual Arts majors.

### DPA 4030\* Visual Foundations of Digital

Production II 3 (6) Extends the foundational visual principles underlying computer graphics production begun in DPA 4020. Stresses representation of the figure in drawing and the use of cameras. Incorporates the studio method and the critique process, and stresses examples from the history of art, animation and film. *Preq:* DPA 4020. Not open to Architecture or Visual Arts majors.

## DESIGN STUDIES

*Professors:* D.J. Allison, J.F. Barker, *President Emeriti*; K.E. Green, R.J. Hogan, *Associate Chair*; K.L. Schwensen, *Chair*; S.F. Verderber, *Associate Professors:* D.G. Battisto, D.N. Harding, D.A. Hecker, R.T. Silance; *Assistant Professors:* D.G. Albright, C.R. Barrios Hernandez, V.Y. Blouin, U. Ersoy, S.R. Hambright-Belue, U. Heine, R.T. Huff (*Charleston*), P.L. Laurence, D.M. Lee, A.E. Montilla, M.L. Skinner; *Senior Lecturers:* R.A. Bruhns, A.H. Jacques, C.B. Mills; *Lecturers:* N. W. Ault, J.B. Garland, P.W. Head (*Charleston*), A.K. Jennings (*Charleston*), J.A. Lindsey (*Charleston*), D.A. Pastre (*Charleston*), J.G. Thomas (*Charleston*)

**DSGN 3700 Design Principles 6 (1)** Students develop graphic skills, including plans, sections, elevations, axonometric and perspective drawings, and develop creative problem solving skills incorporating precedent studies, contextual analysis, concept development, modeling and presentation skills. Course is offered only during the summer at study abroad locations. *Preq:* ARCH 1010. *Coreq:* DSGN 3701.

### DSGN 3701 Design Principles Laboratory 0 (10)

Non-credit laboratory to accompany DSGN 3700. *Coreq:* DSGN 3700.

## EAST ASIAN STUDIES

### EAS 1230 Introduction to China 3 (3)

Introduction to various aspects of Chinese civilization, including geography, ethnic groups, language, history, philosophy, religion, literature, arts, architecture, and social customs. All readings and discussions are in English.

## ELECTRICAL AND COMPUTER ENGINEERING

*Professors:* E.R. Collins Jr., K.A. Corzine, J.N. Gowdy, T.H. Hubing, E.G. Johnson, E.B. Makram, D.L. Noneaker, M.B. Pursley, R.J. Schalkoff, R. Singh, G.K. Venayagamoorthy, I.D. Walker, H. Xiao; *Associate Professors:* C.W. Baum, R.R. Brooks, T.C. Burg, L. Dong, W.R. Harrell, A.W. Hoover, W.B. Ligon III, A.Q. Martin, H.B. Russell, K.-C. Wang, P. Wang; *Assistant Professors:* R.E. Groff, S. Kim, H. Shen, M.C. Smith, L. Zhu; *Visiting Associate Professors:* S.J. Hubbard, W.J. Reid III; *Visiting Lecturer:* R. Hadidi

### ECE 1010 Robots in Business and Society 3 (3)

Explores the significant role that robotics and automation play in society. Students gain an appreciation of the ethics, economics, psychology, politics and technologies that must be considered in the use of robots. Includes hands-on exercises using Legos to explore robot construction and intelligence. Open only to non-engineering majors.

### ECE 1990 Creative Inquiry—Electrical and

Computer Engineering 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

### ECE 2010 Logic and Computing Devices 2 (2)

Introduction to Boolean algebra and digital logic. Topics include number systems and representation of information; Boolean operators and algebra; expression minimization; combinational circuits, including adders, comparators, decoders and multiplexors; sequential logic, including flip-flops, shift registers, counters and memory. Includes Honors sections. *Preq:* MATH 1080 and PHYS 1220, each with a C or better.

**ECE 2020 Electric Circuits I 3 (3)** Study of DC resistive circuits, Kirchhoff's Laws, Nodal and Mesh emphasis, sources, Thevenin's and Norton's theorems, RC, RL, RCL circuit solutions with initial condition using homogenous or nonhomogenous ordinary differential equations having constant coefficients. Develop sinusoidal steady state solution. Includes Honors sections. *Preq:* MATH 1080 and PHYS 1220, each with a C or better. *Preq or concurrent enrollment:* PHYS 2210 with a C or better.

**ECE 2040 Circuit Analysis Problems I 1 (3)** Analysis and solution of electrical network problems using mesh and nodal analysis, Thevenin's and Norton's theorems and equivalent circuits and other circuit analysis from ECE 2020. *Preq or concurrent enrollment:* ECE 2020 with a C or better.

### ECE 2070 Basic Electrical Engineering 2 (2)

A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge of DC and AC circuit theory, AC power distribution, and numerous electrical devices, apparatus, and digital systems. Credit may not be received for both ECE 2070 and ECE 3080. *Preq:* MATH 2060 and PHYS 2210.

### ECE 2080 Electrical Engineering Laboratory I

1 (2) Laboratory to accompany ECE 2070. Basic electrical circuits and instrumentation. *Preq or concurrent enrollment:* ECE 2070.

### ECE 2090 Logic and Computing Devices Laboratory

1 (2) Introduction to designing, building, simulating and testing digital logic circuits. Topics include SSI and MSI ICs; general combinational circuits; adders, decoders and multiplexors; general sequential circuits; shift registers, counters and memory. Includes Honors sections. *Preq or concurrent enrollment:* ECE 2010 with a C or better.

### ECE 2110 Electrical Engineering Laboratory I

1 (2) Principles of measurement and instruments used to measure parameters and dynamic variables in electric circuits, steady state and transient measurements in DC and AC circuits, and data analysis methods are included. *Preq or concurrent enrollment:* ECE 2020 with a C or better.

### ECE 2120 Electrical Engineering Laboratory II 1

(2) Emphasizes measurement techniques in AC steady-state circuits and comparison to theoretical predictions. Two-port network methodology and transfer functions are studied experimentally and related to analysis using transform techniques. *Preq:* ECE 2020 and ECE 2110, each with a C or better. *Preq or concurrent enrollment:* ECE 2620 with a C or better.

### ECE 2220 Systems Programming Concepts for

Computer Engineering 3 (3) Development of computer systems programming and code reading techniques. Tools, programming languages, libraries, operating systems, and hardware. Code reading is emphasized. Programming projects reinforce course topics. *Preq:* CPSC 1110 with a C or better.

### ECE 2230 Computer Systems Engineering

3 (3) Analysis of implementation techniques for systems software. Applying engineering principles including code reading to the design of data structures and algorithms for low level computer systems, embedded systems, and hardware/software systems. Includes coverage of address translation, memory management, file systems, and process management. *Preq:* ECE 2220 with a C or better.

- ECE 2620 Electric Circuits II 3 (3)** Continuation of the study of electric circuits, including three-phase circuits, complex frequency and network functions, frequency response, two-port parameters, magnetically-coupled circuits, Laplace transforms, and introduction to Fourier series and transforms. Includes Honors sections. *Preq:* ECE 2020 and MATH 2060 and PHYS 2210, each with a C or better. *Preq or concurrent enrollment:* MATH 2080 with a C or better.
- ECE 2630 Circuit Analysis Problems II 1 (3)** Analysis of basic AC circuit analysis techniques to analyze the transient and steady-state behavior of both simple and complex circuits. *Preq or concurrent enrollment:* ECE 2620 and MATH 2080, each with a C or better.
- ECE 2720 Computer Organization 3 (3)** Introductory course in computer organization and architecture. Topics include CPUs, memory, I/O, processor families, buses, peripherals, microarchitectures, and instruction sets. Includes Honors sections. *Preq:* ECE 2010 and CPSC 1110, each with a C or better.
- ECE 2730 Computer Organization Laboratory 1 (2)** Laboratory enhances students' understanding of computer organization via assignments involving assembly language programming. Topics include basic syntax, branching and loops, addressing modes, arrays and pointers, subroutines and stacks. Includes Honors sections. *Preq or concurrent enrollment:* ECE 2720 with a C or better.
- ECE 2990 Creative Inquiry—Electrical and Computer Engineering 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. Includes Honors sections. *Preq:* Consent of faculty member/mentor.
- ECE 3000 Junior Honors Seminar 1 (2)** Acquaints students enrolled in the Departmental Honors Program with current research activities in the Department. Faculty provide seminars where research interests are summarized. Seminars are planned to prepare students in choosing research topics for their senior theses.
- ECE 3080 Fundamentals of Electrical Engineering 3 (3)** A first course in electrical engineering to provide non-Electrical Engineering majors with a knowledge DC and AC circuit theory, AC power distribution, numerous electrical devices, digital systems, instrumentation and measurement systems, electronics, electromechanics, and electric motors. Credit may not be received for both ECE 2070 and 3080. *Preq:* MATH 2060 and PHYS 2210.
- ECE 3110 Electrical Engineering Laboratory III 1 (2)** Measurements and characteristics of electronic devices and circuits; use of manual and automated instruments to acquire data; oral and written engineering reports. *Preq:* ECE 2120 and ECE 2620 and MATH 2080 and PHYS 2210, each with a C or better. *Preq or concurrent enrollment:* ECE 3200 with a C or better.
- ECE 3120 Electrical Engineering Laboratory IV 1 (2)** Design and characterization of functional circuits using solid-state devices; use of manual and automated instruments for measurements; statistical analysis of data; preparation of engineering reports. *Preq:* ECE 3110 and ECE 3200, each with a C or better. *Preq or concurrent enrollment:* ECE 3210 with a C or better.
- ECE 3170 Random Signal Analysis 3 (3)** Introduction to engineering problems of a probabilistic nature. Systems transformations, statistical averages, simulation, and estimation of system parameters. Includes Honors sections. *Preq:* ECE 2620 and MATH 2080, each with a C or better. *Preq or concurrent enrollment:* ECE 3300 with a C or better.
- ECE 3200 Electronics I 3 (3)** Introduction to electronic materials and devices; principles of design; design of DC and AC circuits using diodes, bipolar junction transistors, field-effect transistors and use of transistors in digital circuits. Includes Honors sections. *Preq:* ECE 2620 and MATH 2080 and PHYS 2210, each with a C or better.
- ECE 3210 Electronics II 3 (3)** Analysis and design of discrete amplifier circuits at low and high frequencies; operational amplifiers, distortion in amplifiers, oscillator design, and circuit analysis of active digital devices. *Preq:* ECE 3200 with a C or better.
- ECE 3220 Introduction to Operating Systems 3 (3)** Detailed study of management techniques for the control of computer hardware resources. Topics include interrupt systems, primitive level characteristics of hardware and the management of memory, processor devices, and data. May also be offered as CPSC 3220. *Preq:* CPSC 2120 and CPSC 2310, each with a C or better; or ECE 2230 and ECE 2720, each with a C or better.
- ECE 3270 Digital Computer Design 3 (3)** Design of high-speed ALUs, control and timing circuitry, memory systems and I/O circuitry; microprogrammed computer design using bit-slice microprocessors; current hardware topics related to computer design; hands-on design experience; and use of logic analyzer for system debugging. *Preq:* ECE 3710 with a C or better.
- ECE 3290 Computer Systems Structures 3 (3)** Fundamental structures and issues that arise in the analysis and implementation of computer systems. Topics include operating systems structures and data structures and their relationship to computer organization. Engineering science background for computer systems design. *Preq:* ECE 2230 and ECE 2720, each with a C or better.
- ECE 3300 Signals, Systems, and Transforms 3 (3)** Study of systems models, analysis of signals, Fourier series and transforms, sampling and Z transforms, discrete Fourier transforms. Includes Honors sections. *Preq:* ECE 2620 and MATH 2080, each with a C or better.
- ECE 3520 Programming Systems 3 (3)** Second course in programming languages and systems. Topics include assemblers, compilers, and syntactical methods; string manipulation and list processing; concepts of executive programs and operating systems; introduction to time-sharing systems. May also be offered as CPSC 3520. *Preq:* ECE 2230; or CPSC 2120 and CPSC 2150, each with a C or better. *Preq or concurrent enrollment:* CPSC 2070 or MATH 4190, each with a C or better.
- ECE 3600 Electric Power Engineering 3 (3)** Presents the basic principles of electromagnetic induction and electromagnetic forces developed. Topics include synchronous machines, power transformers, electric power transmission, and distribution systems, DC motors, and induction motors. *Preq:* ECE 2620 and PHYS 2210, each with a C or better.
- ECE 3710 Microcontroller Interfacing 3 (3)** Discusses the programming and interfacing of microcontrollers in order to control their integrated devices and external peripherals. Topics include memory and I/O; interrupts, counters and timers; ADCs and DACs; PWMs; and parallel and serial communication. *Preq:* ECE 2620 and ECE 2720, each with a C or better. *Preq or concurrent enrollment:* ECE 3200 with a C or better.
- ECE 3720 Microcontroller Interfacing Laboratory 1 (3)** Discusses the programming and interfacing of microcontrollers in order to control their integrated devices and external peripherals. Topics include memory and I/O; interrupts, counters and timers; ADCs and DACs; PWMs; and parallel and serial communication. *Preq or concurrent enrollment:* ECE 3710 with a C or better.
- ECE 3800 Electromagnetics 3 (3)** Introduction to electric fields and potentials, dielectrics, capacitance, resistance, magnetic field, forces, work and energy, inductance, time-varying fields, and Maxwell's equations. *Preq:* ECE 2620 and MATH 2060 and PHYS 2210, each with a C or better.
- ECE 3810 Fields, Waves, and Circuits 3 (3)** Covers foundation of circuit theory, transmission lines and circuits, plane-wave propagation, fiber optics, radiation and antennas, and coupled circuits. *Preq:* ECE 3800 and MATH 2080, each with a C or better.
- ECE 3990 Creative Inquiry—Electrical and Computer Engineering 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. Includes Honors sections. *Preq:* Consent of faculty member/mentor.
- ECE 4040\* Semiconductor Devices 3 (3)** Consideration of the principles of operation, external characteristics, and applications of some of the more important semiconductor devices presently available. *Preq:* ECE 3200 with a C or better. *Preq or concurrent enrollment:* MATH 3110 or MATH 4340, each with a C or better.
- ECE 4050 Design Projects in Electrical and Computer Engineering 1-3 (1-3)** Individually defined projects oriented toward providing experience in establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. Develops student creativity through the solution of open-ended problems. Includes individual instruction in design methodology. May be repeated for a maximum of three credits. *Preq:* ECE 3300 or ECE 4090, each with a C or better; and consent of project supervisor.

- ECE 4060\* Introduction to Microelectronics Processing** 3 (3) Microelectronic processing, MOS and bipolar monolithic circuit fabrication, thick and thin film hybrid fabrication, applications to linear and digital circuits, fundamentals of device design. *Preq:* ECE 3200 with a C or better. *Preq or concurrent enrollment:* MATH 3110 or MATH 4340, each with a C or better.
- ECE 4090 Continuous and Discrete Systems Design** 3 (3) Introduction to classical linear control systems. Topics include continuous and discrete descriptions of systems, time and frequency response, stability, system specification, system design of continuous and discrete systems. *Preq:* ECE 3300 with a C or better.
- ECE 4120 Electrical Machines Laboratory** 1 (2) Selected experiments to familiarize students with characteristics of transformers, DC and AC motors and generators. Measurement techniques and component modeling are included. *Preq or concurrent enrollment:* MATH 4340 with a C or better; and ECE 3600 or ECE 4190, each with a C or better.
- ECE 4170\* Elements of Software Engineering** 3 (3) Foundations of software design, reasoning about software, the calculus of programs, survey of formal specification techniques and design languages. *Preq:* ECE 3220 and ECE 3520 and MATH 4190, each with a C or better.
- ECE 4180\* Power System Analysis** 3 (3) Study of power system planning and operational problems. Topics include load flow, economic dispatch, fault studies, transient stability, and control of problems. System modeling and computer solutions are emphasized through class projects. *Preq:* ECE 3600 and ECE 3800, each with a C or better.
- ECE 4190\* Electric Machines and Drives** 3 (3) Performance, characteristics, and modeling of AC and DC machines during steady-state and transient conditions. Introduction to power electronics devices and their use in adjustable speed motor drives. *Preq:* ECE 3210 and ECE 3600 and ECE 3800, each with a C or better. *Preq or concurrent enrollment:* MATH 4340 with a C or better.
- ECE 4200\* Renewable Energy Penetration on the Power Grid** 3 (3) Introduces the basic definition of electrical power, interfacing primary sources, generator/load characteristics, and renewable energy resources. Topics include solar energy grid interfacing, wind energy grid interfacing, battery charging/management, harmonic distortion, voltage sags, and national standards. *Preq:* ECE 2070 or ECE 3200, each with a C or better.
- ECE 4220\* Electronic System Design I** 3 (2) Emphasizes the application of theory and skills to the design, building, and testing of an electronic system with both analog and digital components. Application varies each semester. Computer software tools are used extensively in the design process. *Preq:* ECE 3210 and ECE 3300 and ECE 3600 and ECE 3710 and ECE 3810, each with a C or better. *Coreq:* ECE 4221.
- ECE 4221\* Electronic System Design I Laboratory** 0 (2) Non-credit laboratory to accompany ECE 4220. *Coreq:* ECE 4220.
- ECE 4270 Communications Systems** 3 (3) Study of communication systems design and analysis. Topics include signals and spectra, baseband signaling and detection in noise, digital and analog modulation and demodulation techniques, communications link budget analysis. *Preq:* ECE 3170 and ECE 3300, each with a C or better.
- ECE 4290\* Organization of Computers** 3 (3) Computer organization and architecture. Topics include a review of logic circuits, bus structures, memory organization, interrupt structures, arithmetic units, input-output structures, state generation, central processor organization, control function implementation, and data communication. Registered Transfer Language (RTL) for description and design of digital systems. *Preq:* ECE 2720 with a C or better.
- ECE 4300\* Digital Communications** 3 (3) Introduction to modern digital communication systems, emphasizing modulation and detection, taking into account the effects of noise. Includes Honors sections. *Preq:* ECE 3170 and ECE 3300, each with a C or better; and consent of instructor. Consent is not required for honors students.
- ECE 4320\* Instrumentation** 3 (3) Theory and analysis of transducers and related circuits and instrumentation. Generalized configurations and performance characteristics of instruments are considered. Transducer devices for measuring physical parameters such as motion, force, torque, pressure, flow, and temperature are discussed. *Preq:* ECE 3210 with a C or better. *Preq or concurrent enrollment:* MATH 3110 or MATH 4340, each with a C or better.
- ECE 4350\* Grounding and Shielding** 3 (3) Introduction to electromagnetic compatibility concepts and techniques for students who will be designing or working with electronic systems when they graduate. Topics include electromagnetic interference and noise control, crosstalk and signal integrity, grounding, filtering, shielding, circuit board layout, lightning and electrostatic discharge protection. *Preq:* ECE 3810 with a C or better.
- ECE 4360\* Microwave Circuits** 3 (3) Analysis of microwave networks comprising transmission lines, waveguides, passive elements, interconnects, and active solid state microwave circuits. Use of modern CAD tools to design RF/Microwave passive/active networks. Fabrication of typical circuits. *Preq:* ECE 3810 with a C or better. *Preq or concurrent enrollment:* MATH 3110 or MATH 4340, each with a C or better.
- ECE 4380\* Computer Communications** 3 (3) Digital data transmission techniques, modems and communications channels, communications software and protocols, multiprocessors and distributed processing; concurrency and cooperation of dispersed processors. *Preq:* Senior standing in Electrical or Computer Engineering or Computer Science.
- ECE 4390\* Fiber Optics** 3 (3) Covers the underlying principles of design for optical fibers in practical systems. Examines optical fiber as a waveguide using wave optics and ray optics. Discusses design criteria for using mono- and multi-mode fibers. Other topics include fabrication, measurement. *Preq:* ECE 3810 with a C or better. *Preq or concurrent enrollment:* MATH 4340 with a C or better.
- ECE 4400\* Performance Analysis of Local Computer Networks** 3 (3) Introduction to the design and performance analysis of local computer networks. Emphasizes performance analysis of representative multi-access procedures. Three common types of networks are considered in detail. *Preq:* ECE 2720 and ECE 3170, each with a C or better.
- ECE 4420\* Knowledge Engineering** 3 (3) Introduction to the theoretical and practical aspects of knowledge engineering or applied artificial intelligence. Topics include symbolic representation structures and manipulation, unification, production systems and structures, rule-based and expert systems, planning and AI system architectures; system design in PROLOG and LISP. Project is required. *Preq:* ECE 3220 and ECE 3520, each with a C or better.
- ECE 4460\* Antennas and Propagation** 3 (3) Study of the theoretical and practical aspects of antenna design and utilization, input impedances, structural considerations, and wave propagation. *Preq:* ECE 3300 and ECE 3810; and one of MATH 3110 or MATH 4340, each with a C or better.
- ECE 4490\* Computer Network Security** 3 (1) Hands-on practicum in the administration and security of modern network service emphasizing intrusion prevention techniques, detection, and recovery. *Preq:* Senior standing in Computer Engineering or Electrical Engineering. *Coreq:* ECE 4491.
- ECE 4491\* Computer Network Security Laboratory** 0 (4) Non-credit laboratory to accompany ECE 4490. *Coreq:* ECE 4490.
- ECE 4530 Software Practicum** 3 (1) Students design and implement a software system that satisfies both a requirements and specifications document. The resulting system is tested for compliance. *Preq:* ECE 3220 and ECE 3520, each with a C or better. *Coreq:* ECE 4531.
- ECE 4531 Software Practicum Laboratory** 0 (6) Non-credit laboratory to accompany ECE 4530. *Coreq:* ECE 4530.
- ECE 4550\* Robot Manipulators** 3 (3) Analysis of robot manipulator systems with special focus on interaction of these technologies with society. Emphasis is on rigid-link robot manipulator systems. Topics include history of robot technology, kinematics, dynamics, control, and operator interfaces. Case studies reinforce impact of robot technology on society and vice versa. *Preq:* MATH 2060 and MATH 3110, each with a C or better.
- ECE 4570\* Fundamentals of Wind Power** 3 (3) Introduces wind turbine systems, including wind energy potential and application to power generation. Topics include wind energy principles, wind site assessment, wind turbine components, power generation machinery control systems, connection to the electric grid, and maintenance. May also be offered as ME 4570. *Preq:* ECE 2070 or ECE 3200 with a C or better.
- ECE 4590\* Integrated Circuit Design** 3 (2) Design concepts and factors influencing the choice of technology; fundamental MOS device design; silicon foundries, custom and semicustom integrated circuits; computer-aided design software/hardware trends and future developments; hands-on use of CAD tools to design standard library cells; systems design considerations, testing, and packaging. *Preq:* ECE 3210 with a C or better. *Preq or concurrent enrollment:* MATH 3110 or MATH 4340, each with a C or better. *Coreq:* ECE 4591.

**ECE 4591\* Integrated Circuit Design Laboratory** 0 (2) Non-credit laboratory to accompany ECE 4590. *Coreq:* ECE 4590.

**ECE 4600 Computer-Aided Analysis and Design** 3 (3) Principles and methods suited to the solution of engineering problems on the digital computer. Topics include widely used methods for the solution of the systems of algebraic and/or differential equations which arise in modeling of engineering systems, data approximation and curve fitting, continuous system simulation languages, and design-oriented programming systems. *Preq:* ECE 2620 and MATH 3110 and MATH 4340, each with a C or better.

**ECE 4610\* Fundamentals of Solar Energy** 3 (3) Introduces solar energy conversion systems. Topics include environmental benefits of solar energy, solar thermal systems, concentration solar power, photovoltaic (PV) cell design and manufacturing, sizing of PV system, hybrid photovoltaic/thermal systems, energy storage, and urban/rural applications. *Preq:* ECE 3200 with a C or better.

**ECE 4670\* Introduction to Digital Signal Processing** 3 (3) Introduction to characteristics, design, and applications of discrete time systems; design of digital filters; introduction to the Fast Fourier Transform (FFT); LSI hardware for signal processing applications. *Preq:* ECE 3300 with a C or better.

**ECE 4680\* Embedded Computing** 3 (2) Principles of using computing in the larger context of a system. Topics include bus and processor design types (e.g. microprocessor, microcontroller, DSP), codecs, digital circuit power management, real time scheduling, and embedded operating systems. Lab work consists of projects on embedded hardware (e.g. PC-104+). *Preq:* ECE 2230 and ECE 3710, each with a C or better. *Coreq:* ECE 4681.

**ECE 4681\* Embedded Computing Laboratory** 0 (2) Non-credit laboratory to accompany ECE 4680. *Coreq:* ECE 4680.

**ECE 4700 Vehicle Electronics** 3 (3) Introduction to vehicle electronic systems and networks. Topics include a review of electronic systems in automotive and aerospace applications; vehicle components, sensors and actuators; communication busses; electric power generation and distribution in vehicle systems; vehicle diagnostics; reliability; and trends in vehicle system design. *Preq:* ECE 3200 with a C or better.

**ECE 4710 Electric Vehicles and Energy Storage** 3 (3) Introduction to hybrid electric propulsion systems and energy storage systems. Topics include a review of fundamentals of electric vehicles and hybrid electric vehicles architectures covering reasons for hybridization, energy analysis of architecture and components; overview of energy storage systems (batteries and supercapacitors); modeling of components; vehicle simulation; and supervisory control. *Preq:* ECE 3200 with a C better.

**ECE 4730\* Introduction to Parallel Systems** 3 (3) Introduces parallel computer architectures and their programming. Includes an introduction to MPI and OpenMP and a number of engineering problems, including numerical simulations. Introduces scalability analysis. *Preq:* ECE 3220 or ECE 3290, each with a C or better.

**ECE 4910 Undergraduate Honors Research** 1-6 (1-6) Individual research projects conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits.

**ECE 4920\* Special Problems** 1-3 (1-3) Special assignment in electrical or computer engineering. Some typical assignments include computer programs, term papers, technical literature searches, hardware projects, and design project leadership. May be taken only once for credit.

**ECE 4930\* Selected Topics** 1-3 (1-3) Classroom study of current and new technical developments in electrical and computer engineering. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

**ECE 4950 Integrated System Design I** 2 (1) Considers engineering design of systems in a continuous process of project definition, planning, execution, and evaluation. This process includes consideration of both technical and non-technical factors in design. Strong emphasis is placed on the development of effective technical communications skills, particularly oral communications competency. *Preq:* Electrical Engineering major and ECE 3200 and ECE 3300 and ECE 3600 and ECE 3800, each with a C or better; or Computer Engineering major and ECE 3200 and ECE 3220 and ECE 3300 and ECE 3520 and ECE 3710, each with a C or better. *Coreq:* ECE 4951.

**ECE 4951 Integrated System Design I Laboratory** 0 (3) Non-credit laboratory to accompany ECE 4950. *Coreq:* ECE 4950.

**ECE 4960 Integrated System Design II** 2 (6) Project-oriented course which brings together electrical and computer engineering students of dissimilar training in teams or project groups. Group assignments are designed to develop an appreciation for individual and creative thinking, as well as team effort. *Preq:* Electrical Engineering major and ECE 3210 and ECE 3710 and ECE 3810 and ECE 4090 and ECE 4950, each with a C or better; or Computer Engineering major and ECE 4090 and ECE 4950, each with a C or better.

**ECE 4990 Creative Inquiry—Electrical and Computer Engineering** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. Includes Honors sections. *Preq:* Consent of faculty member/mentor.

## ECONOMICS

*Professors:* H. Bodenhorn, W.R. Dougan, M. Espey, R.K. Fleck, T. W. Hazlett, T.A. Mroz, R.D. Sauer, Jr., *Chair:* C.J. Simon, Jr., R.F. Tamura, R.D. Tollison, P.W. Wilson; *Associate Professors:* S.L. Baier, F.A. Hanssen, M.J. Jerzmanowski, M. Lewis, S.R. Templeton, K.K. Tsui; *Assistant Professors:* C. Lam, D. Miller, S. Mityakov, J. Oliveira, P. Warren, D. Wood; *Visiting Professor:* G.P. Dwyer, Jr.

**ECON 2000 Economic Concepts** 3 (3) One-semester survey of basic economic concepts that offers an overview of both microeconomics and macroeconomics. Not intended for business majors or other students seeking a comprehensive introduction to economic analysis and its applications. Credit will not be given to students who have received credit for ECON 2110 or 2120.

**ECON 2110 Principles of Microeconomics** 3 (3) Introduction to economic reasoning and its application to the study of the behavior of consumers and business firms. Particular topics include competition, monopoly, international trade, and the impact of selected public policies. Intended as the first of a two-semester sequence in the foundations of economics. Includes Honors sections.

**ECON 2120 Principles of Macroeconomics** 3 (3) Continuation of ECON 2110 in which fundamental economic principles are applied to the study of aggregate economic performance. Topics include the forces determining the rates of inflation, unemployment, and economic growth, with particular emphasis on the influence of fiscal and monetary policies through financial markets. Includes Honors sections. *Preq:* ECON 2110.

**ECON 3010 Economics of Labor** 3 (3) Introduces students to the economics of the labor market and labor relations. Considers the theories of wages and employment, determination, unemployment, investment in human capital, discrimination, and public policy toward the labor market. Also considers the role of labor unions. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 2110.

**ECON 3020 Money and Banking** 3 (3) Considers the function of money and banking in both the product and financial markets. Special emphasis is placed on monetary theory and current problems of monetary policy. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 2120.

**ECON 3030 Economics and Sports** 3 (3) Economic analysis of sports teams, leagues, and institutions. Analyzes basic economic issues using sports data. May not be used to satisfy requirements for a degree in Economics. Credit will not be given to students who have completed ECON 4260. *Preq:* ECON 2110.

**ECON 3060 Managerial Economics** 3 (3) Uses tools of economic analysis in classifying problems in organizing and evaluating information, and in comparing alternative courses of action. Bridges the gap between economic theory and managerial practices. May not be used to satisfy requirements for a degree in Economics. May also be offered as MGT 3060. *Preq:* ECON 2110.

**ECON 3070 Arbitration** 3 (3) Analyzes dispute settlement procedures emphasizing mediation, fact-finding, and arbitration as they are used to resolve labor-management disputes in the public and private sectors. *Preq:* Consent of instructor.

**ECON 3090 Government and Business** 3 (3) Relationships between government and business, including, among other topics, government efforts to enforce competition; to regulate public utilities; and to protect the special interest of laborers, farmers, and consumers. May not be used to satisfy requirements for a degree in Economics. *Preq:* ECON 2110.



- ECON 3100 International Economy 3 (3)** Studies of the process of international commerce. Covers basic theory of trade and exchange rates, institutional and legal environment, current policy issues. Not open to students who have taken ECON 4120. May not be used to satisfy requirements for a degree in Economics. *Prq:* ECON 2110 and ECON 2120.
- ECON 3140 Intermediate Microeconomics 3 (3)** Analytical study of basic concepts of value and distribution under alternative market conditions. Includes Honors sections. *Prq:* ECON 2110.
- ECON 3150 Intermediate Macroeconomics 3 (3)** Macroeconomic problems of inflation and unemployment are focal points. Includes statistics (measures of real output and the price level) and theory (covering the sources of short-run fluctuations and long-run growth). Analyzes appropriate public policies addressing these issues. Includes Honors sections. *Prq:* ECON 2120.
- ECON 3190 Environmental Economics 3 (3)** Study of the application of economic logic to issues surrounding environmental management and policy. Examines individual, firm, and collective decision making as well as the evolution of regulatory approaches for controlling environmental use. *Prq:* ECON 3140.
- ECON 3210 Economics of Innovation 3 (3)** Examines the nature of entrepreneurship and the contribution of innovation to economic growth. Investigates the organizational and institutional sources of innovation in different firms and different countries as well as the work of economic theorists concerning the role entrepreneurs play in bringing new products to market. May also be offered as ELE 3210. *Prq:* ECON 3060 or ECON 3140.
- ECON 3250 Personnel Economics 3 (3)** Study of various compensation and personnel practices firms employ. Explains when each of those practices should be followed to elicit the desired employee effort and labor force quality. Topics include piece-rate and time-rate systems, seniority-based incentive schemes, promotion contests, evaluation systems, mandatory retirement, and up-or-out rules. *Prq:* ECON 2110.
- ECON 3400 Behavioral Economics 3 (3)** Introduces the economic, sociological, and psychological aspects of decision making under uncertainty. Presents the psychology of prediction, intuitive prediction: biases and corrective procedures. Topics also include framing, choice with costly information, and social influences on individual behavior. *Prq:* ECON 2110.
- ECON 3440 Economics of Institutions and Property Rights 3 (3)** Study of fundamental property rights structures and institutions in the capitalist economy and the arrangements that create incentives to produce and exchange. *Prq:* ECON 2110 and ECON 2120.
- ECON 3500 Moral and Ethical Aspects of a Market Economy 3 (3)** Can a market system produce results that are fundamentally just? Is justice possible without voluntary exchange? Applies both economic and philosophical analyses to these questions. Emphasizes the causes, consequences, and morality of the distribution of wealth and income in a free-market system. Includes Honors sections. *Prq:* ECON 3140.
- ECON 3600 Public Choice 3 (3)** Covers the economic approach to political activities and institutions. Topics include voting, voting rules, constitutions, political competition, political business cycles, vote trading, interest groups, bureaucracy, committees, legislators, executives, and judges. Designed for Economics and non-Economics majors and requires only basic skills in microeconomics. *Prq:* ECON 2110.
- ECON 3900 Junior Honors Research 1 (1)** Readings and research in conjunction with an approved economics course at the 3000- or 4000-level. Honors status required. May be repeated for a maximum of three credits.
- ECON 3970 Creative Inquiry—Economics I 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of four credits.
- ECON 4010 Labor Market Analysis 3 (3)** Develops the methods of economic analysis of labor markets. Requires students to apply these methods to problems of the labor market. Topics include labor demand and supply, human capital, occupational choice, compensating wage differentials, organizational wage structures and incentive systems, unemployment, and discrimination. *Prq:* ECON 3140.
- ECON 4020 Law and Economics 3 (3)** Application of economics to the law of property, torts, and contracts; regulation of markets, business organizations, and financial transactions; distribution of income and wealth; and criminal law. *Prq:* ECON 2110.
- ECON 4040 Comparative Economic Systems 3 (3)** Comparative analytical and historical study of the principal economic systems which have been important in the modern world including, among others, capitalism and socialism. *Prq:* ECON 3140.
- ECON 4050\* Introduction to Econometrics 4 (3)** Introduction to methods of quantitative analysis of economic data. Reviews basic statistical methods and probability distribution. Topics include data management using professional statistical software applications; multiple regression analysis; hypothesis testing under conditions of multicollinearity, heteroscedasticity, and serial correlation. *Prq:* ECON 2110 and ECON 2120; and either MATH 1080 or MATH 2070; and either STAT 3090 or STAT 3300. *Coreq:* ECON 4051.
- ECON 4051\* Introduction to Econometrics Laboratory 0 (3)** Non-credit laboratory to accompany ECON 4050. *Coreq:* ECON 4050.
- ECON 4060\* Advanced Econometrics 3 (3)** Reviews statistical inference using multiple regression (OLS) analysis and model specification. Topics include multicollinearity, heteroscedasticity, and serial correlation; two-staged least squares and instrumental variables models; simultaneous equations models; limited dependent variable models using maximum likelihood estimation and time-series analysis; and presentation of results in technical writing. *Prq:* ECON 4050.
- ECON 4100\* Economic Development 3 (3)** Consideration and analysis of economic and related problems of underdeveloped countries. Attention is given to national and international programs designed to accelerate solution of these problems. *Prq:* ECON 3140.
- ECON 4110\* Economics of Education 3 (3)** Analysis of economic issues related to education. The decision to invest in education, elementary and secondary school markets and reform, the market for college education, teacher labor markets, and education's effects on economic growth and income distribution. *Prq:* ECON 3140.
- ECON 4120\* International Microeconomics 3 (3)** Analysis of the essential aspects of international economic linkages. Discusses gains and redistributive effects of trade and the barriers to trade within the context of a variety of economic models. Also discusses the history of trade policy and the political economy of its determination. *Prq:* ECON 3140.
- ECON 4130\* International Macroeconomics 3 (3)** Examination of macroeconomic linkages between an individual country and the rest of the world and how these linkages are affected by the choice of exchange rate regimes. Topics include the relation between domestic and foreign interest rates and exchange rates and the ability to pursue independent monetary policies. *Prq:* ECON 3150.
- ECON 4190 Economics of Defense 3 (3)** Examines the American defense establishment in terms of resources utilized, alternative uses, and the contribution to the national economy and scientific progress generated by resources in a defense use. Discusses economic problems inherent in shifting resources between defense and nondefense uses and among alternative defense uses. *Prq:* ECON 3140.
- ECON 4200 Public Sector Economics 3 (3)** Study of the role of government and its proper functions and limitations in a market. Provision of goods and services by all levels of government and instruments of taxation are evaluated according to efficiency and equity criteria. Contemporary public sector issues are emphasized throughout. *Prq:* ECON 3140.
- ECON 4220\* Monetary Economics 3 (3)** Intensive study of the role of monetary factors in economic change. Modern monetary theories and their empirical relevance for policy are developed against a background of monetary history and institutions. *Prq:* ECON 3140 and ECON 3150.
- ECON 4230\* Economics of Health 3 (3)** Applies microeconomic theory to examine the demand for health services and medical care, the market for medical insurance, the behavior of physicians and hospitals, and the role of government in health-care provision and regulation. *Prq:* ECON 3140.
- ECON 4240\* Organization of Industries 3 (3)** Empirical, historical, and theoretical analyses of market structure and concentration in American industry: the effects of oligopoly, monopoly, and cartelization upon price, output, and other policies of the firm; antitrust and other public policies and problems are studied. *Prq:* ECON 3140.
- ECON 4250\* Antitrust Economics 3 (3)** Analysis of the economic and legal issues created by the exercise of market power. The motivation and execution of government policy towards mergers, predatory conduct, and various restraints of trade are intensively examined. *Prq:* ECON 3090 or ECON 3140.

**ECON 4260\* Seminar in Sports Economics 3 (3)**  
Economic analysis of sports teams, leagues, and institutions. Topics include antitrust issues, public funding of sports venues, labor relations, wagering markets, athlete compensation, and application of economic principles to sports settings. Empirical research project is cornerstone of course. Includes Honors sections. *Preq:* ECON 3140 and ECON 4050.

**ECON 4270\* Development of the American Economy 3 (3)** Explores several topics relevant to understanding the American experience. Considers the institutions and developments critical to America's ascendancy from a small country to a dominant global economic power. Investigates immigration, innovation, education, finance, and the changing role of race and gender in the economy. *Preq:* ECON 3140 and ECON 3150.

**ECON 4280\* Cost-Benefit Analysis 3 (3)** Develops techniques for the appraisal of public expenditure programs with particular emphasis on investment in infrastructure. Topics include choice of an appropriate discount rate and the calculation of social costs and benefits in the presence of market distortions. *Preq:* ECON 3140.

**ECON 4300\* Topics in Mathematical Economics 3 (3)** This course develops the mathematical tools underlying economic analysis and prepares students for doing advanced theoretical work in economics. The topics covered in this course provide excellent preparation for advanced economics courses, and lay the foundation for doing quantitative analysis associated with both career work and graduate study in economics. *Preq:* ECON 3140; and either MATH 1080 or MATH 2070.

**ECON 4350 Family Economics 3 (3)** Analysis of economic aspects of the family. Economics of marriage, divorce, fertility, public policies affecting the family, women's labor force participation, and the gender gap are studied using main economic theories and empirical studies. *Preq:* ECON 3140.

**ECON 4400\* Game Theory 3 (3)** Introduction to the formal analysis of strategic interaction among rational, self-interested rivals. Basic theoretical aspects of games are discussed and applied to such topics as bargaining, voting, auctions, and oligopoly. *Preq:* ECON 3140 and MATH 1060; or ECON 4300.

**ECON 4550\* Applied Microeconomic Research 3 (3)** Students conduct research in applied microeconomics. Topics vary according to student and professor interests. Students read papers in the literature, formulate their own economic hypotheses, and collect and analyze data to test those hypotheses. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* ECON 3140.

**ECON 4570\* Natural Resource Use, Technology, and Policy 3 (3)** Focuses on economic analyses of actual, efficient, and sustainable uses of natural resources, impacts of technologies that affect these uses, and policies that affect development and use of such technologies. Resource-technology-policy combinations may vary, but an example is crude oil, hybrid automotive engines, and fuel economy standards. May also be offered as APEC 4570. *Preq:* MATH 1020 or MATH 1060; and APEC 3570 or ECON 3140.

**ECON 4910 Senior Honors Thesis Research 3 (3)**  
Reading and research for the Senior Honors Thesis. *Preq:* ECON 3140 and ECON 3150 and senior honors standing.

**ECON 4920 Senior Honors Thesis Writing 3 (3)**  
Writing and oral presentation of the Senior Honors Thesis. *Preq:* ECON 4910.

**ECON 4960 Independent Study 1-3 (1-3)** Research and writing on a selected economics topic chosen by the student. A written proposal must be approved by the instructor prior to the start of the semester. May be repeated for a maximum of six credits. *Preq:* ECON 3140.

**ECON 4970 Creative Inquiry—Economics II 1-3 (1-3)** Engages students in research projects selected by the Economics Department faculty. Research projects vary depending on faculty and student interest. May be repeated for a maximum of six credits. *Preq:* ECON 3140.

**ECON 4980 Selected Topics in Economics 3 (3)**  
In-depth treatment of topics not covered fully in regular courses. Topics vary from year to year. May be repeated for a maximum of nine credits, but only if different topics are covered. Includes Honors sections. *Preq:* ECON 3140 and ECON 3150.

**ECON 4990 Senior Seminar in Economics 1-3 (1-3)** Discussion of topics of current interest in economics. Students conduct directed research on a particular topic. *Preq:* Consent of instructor.

## EDUCATION

*Associate Professor: S.N. Rosenbluth, Chair*

**ED 1010 Effective Strategies for College Success 3 (3)**  
Provides knowledge of specific strategies to increase academic success for college students. Includes instruction in strategies to address engagement and participation, organizational and study skills, test taking, note taking, reading content area text, and writing.

**ED 1030 Introduction to Content Specific Learning Strategies 2 (2)** Through direct experiences, students develop strategies to become proficient problem solvers, design and perform experiments to test hypotheses, analyze connections between core content areas, construct meaning from reading in various disciplines, identify and use resources to improve learning, and communicate effectively. Students must be accepted into and have completed the first two years of the Emerging Scholars pre-college program to enroll in this course.

**ED 1050 Orientation to Education 2 (2)** Introduction to teaching addresses basic program requirements, SoE Conceptual Framework, state evaluation system, the nature of the diverse and multicultural classroom, standards and practices of professional conduct and requirements in teaching. A field experience involving tutoring in a P-12 classroom is required. *Coreq:* ED 1051.

**ED 1051 Orientation to Education Laboratory 0 (1)** Non-credit laboratory to accompany ED 1050. *Coreq:* ED 1050.

**ED 1900 Leadership, Citizenship, and Community Service 3 (3)** Provides active learning opportunities for students to understand better the system of government, learn the mechanics of how leadership can influence education and other initiatives, and develop interpersonal skills that will assist them throughout their professional lives. Culminates with a service learning plan for the students local community.

**ED 1970 Creative Inquiry—Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**ED 2970 Creative Inquiry—Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**ED 3220 Responding to Emergencies 3 (2)** Provides the citizen responder with the knowledge and skills necessary in a variety of emergencies to help sustain life and to minimize pain and the consequences of injury until professional help arrives. Includes first aid, CPR, and automated external defibrillation (AED). *Coreq:* ED 3221.

**ED 3221 Responding to Emergencies Laboratory 0 (1)** Non-credit laboratory to accompany ED 3220. *Coreq:* ED 3220.

**ED 3970 Creative Inquiry—Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**ED 4050 Multiculturalism 3 (3)** Introduces prospective teachers to the influence of culture on learning from an anthropological and historical perspective. *Preq:* HIST 1720 or HIST 1730.

**ED 4380 Selected Topics in Education 1-3 (1-3)** Specific education topics not found in other courses are selected for in-depth study. May be repeated for a maximum of 12 credits, but only if different topics are covered.

**ED 4390 Independent Study in Education 1-3 (1-3)** Study of selected topics in education under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study different from any existing courses and designed for the individual student. May be repeated for a maximum of 12 credits, but only if different topics are covered.

**ED 4410\* Middle School Curriculum 3 (3)** Concepts and methods for teaching middle school students. Discusses nature of middle school students, teacher characteristics, curricular and co-curricular programs, organization, and teaching.

**ED 4970 Creative Inquiry—Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**ED 4990 Education Honors Capstone 1-6 (1-6)** Students seeking departmental honors complete honors research under faculty mentors. Students take a minimum of six hours across at least two semesters. May be repeated for a maximum of 12 credits. *Preq or concurrent enrollment:* EDF 3010 and EDF3020. *Coreq:* ED 4991.

**ED 4991 Education Honors Capstone Laboratory 0 (4)** Non-credit laboratory to accompany ED 4990. *Coreq:* ED 4990.

## EDUCATIONAL COUNSELING

**EDC 1990 Creative Inquiry—Counselor Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**EDC 2340 Introduction to Addictions: Basic Education and Prevention 3 (3)** Basic review of addictions and chemical dependence. Gives future educators skills in the identification of chemical abuse, techniques for intervention, and methods of prevention education. SOC 3960 and 3970 are recommended as follow-up courses for those interested in pursuing the topic.

**EDC 2990 Creative Inquiry—Counselor Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**EDC 3900 Student Development Theory, Leadership, and Counseling Skills for Student Leaders 3 (3)** Introduction to theoretical and practical applications of student development and leadership on the university campus. Develops skills assisting students with leadership development, problem solving, conflict resolution, confrontation, and referral. Explores legal and ethical issues for practitioners and effective utilization of resources available on the campus. May be repeated for a maximum of nine credits.

**EDC 3990 Creative Inquiry—Counselor Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**EDC 4990 Creative Inquiry—Counselor Education 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

## EARLY CHILDHOOD EDUCATION

*Professor:* D.A. Stegelin; *Assistant Professor:* A. Hall, S.M. Linder; *Clinical Faculty:* R.S.N. Wilson

**EDEC 2200 Family, School, and Community Relationships 3 (3)** Historical trends, theoretical models, and strategies of effective family/school/community relationships are examined. Special emphasis is placed on multicultural issues and on programs that support collaborative interaction with families that benefit children. *Preq:* EDEC 3000. *Coreq:* EDEC 3020.

**EDEC 3000 Foundations of Early Childhood Education 3 (3)** Philosophical and historical foundations of early childhood education, societal changes and influences, needs of young children and families, program differentiation, and future trends are examined through coursework and experiential activities. *Preq:* ED 1050 and Sophomore standing. *Coreq:* EDEC 3010.

**EDEC 3010 Practicum in Early Childhood Settings I 1 (3)** Experiences in early childhood settings that provide opportunities for working with young children in a variety of settings. Practicum I and II focus on child care settings for children ages three to four. Practicum I builds on foundations of early childhood by making connections between theory and practice. *Preq:* ED 1050 and Sophomore standing. *Coreq:* EDEC 3000.

**EDEC 3020 Practicum in Early Childhood Settings II 1 (3)** Experiences in early childhood settings that provide opportunities for working with young children in a variety of settings. Practicum I and II focus on child care settings for children ages three to four. Practicum II emphasizes building relationships with families of young children. *Preq:* EDEC 3010. *Coreq:* EDEC 2200.

**EDEC 3030 Practicum in Early Childhood Settings III 1 (3)** Experiences in early childhood settings that provide opportunities for working with young children in a variety of settings. Practicum III focuses on child care settings for children from birth to age two. This experience allows students to understand the developmental needs and capabilities of very young children. *Preq:* EDEC 3020. *Coreq:* EDEC 3360.

**EDEC 3040 Practicum in Early Childhood Settings IV 1 (3)** Experiences in early childhood settings that provide opportunities for working with young children in a variety of settings. Practicum IV focuses on four-year-old kindergartens in public school settings. This experience emphasizes the transition to formal school settings for young children. *Preq:* EDEC 3030. *Coreq:* EDEC 4200 and EDEC 4500.

**EDEC 3360 Concepts of Play and Social Development of Infants and Young Children 3 (3)** Study of the behavior of the preschool child from infancy through age five. Focus is placed on the role of play in influencing cognitive, social, emotional, physical, and language development. Includes Honors sections. *Preq:* EDEC 2200. *Coreq:* EDEC 3030.

**EDEC 4000 Observation and Assessment in Clinical Settings 3 (9)** Clinical experiences in early childhood settings prior to student teaching provide opportunities for observing, guiding, and assessing young children, birth to age eight, in a variety of high quality preschool and primary settings. Practicum spans the entire semester. To be taken Pass/No Pass only. *Preq:* EDEC 4500. *Coreq:* EDEC 4300 and EDEC 4400, EDEC 4600.

**EDEC 4200 Early Childhood Science 3 (2)** Students develop knowledge, skills, and attitudes needed to foster science education among young children. Emphasizes teaching strategies and techniques appropriate for young children (birth to age eight), understanding the unique learning needs of special populations, and integrating science across the curriculum. *Preq:* EDEC 3360. *Coreq:* EDEC 3040 and EDEC 4201 and EDEC 4500.

**EDEC 4201 Early Childhood Science Laboratory 0 (2)** Non-credit laboratory to accompany EDEC 4200. *Coreq:* EDEC 4200.

**EDEC 4300 Early Childhood Mathematics 3 (3)** Examination of theories and methods of teaching mathematics in terms of how young children develop mathematical thinking. Topics include problem solving, current issues, diversity, current technologies, reflective teaching, and applications of math in everyday life. *Preq:* General Education mathematics requirement; admission to the professional level. *Preq:* MATH 1150 and MATH 1160 and MATH 2160 and EDEC 4500. *Coreq:* EDEC 4000 and EDEC 4400 and EDEC 4600.

**EDEC 4400 Early Childhood English Language Arts 3 (3)** Examination of language arts across the early childhood curriculum and ways to develop and support children's language arts practices across content areas. *Preq:* EDEC 4500. *Coreq:* EDEC 4000 and EDEC 4300 and EDEC 4600.

**EDEC 4500 Early Childhood Curriculum and Social Studies Methods 3 (3)** Examination of how content related to social studies can be integrated with concepts across the early childhood curriculum. Focus is on identifying and understanding the curricular needs of young children and how to connect content areas through social studies concepts. *Preq:* EDEC 3360. *Coreq:* EDEC 3040 and EDEC 4200.

**EDEC 4600 Critical Issues and Cultural Diversity in Early Childhood Education 3 (3)** In depth analysis of current and critical issues in early childhood education using a critical multicultural education framework. Topics include critical multiculturalism education, examination of issues of equity and access, early childhood assessment, working in diverse settings, and meeting the educational needs of all learners. *Preq:* EDEC 4500. *Coreq:* EDEC 4000 and EDEC 4300 and EDEC 4400.

**EDEC 4840 Directed Teaching in Early Childhood Education** 9 (1) Supervised observation and teaching experiences in cooperation with nursery schools, kindergartens, and early elementary schools. Restricted to seniors or graduates who have completed prerequisite courses and have the cumulative grade-point average for graduation. *Preq:* EDEC 4000 and EDEC 4300 and EDEC 4400 and EDEC 4600. *Coreq:* EDEC 4841 and EDEC 4850.

**EDEC 4841 Directed Teaching in Early Childhood Education Laboratory** 0 (24) Non-credit laboratory to accompany EDEC 4840. *Coreq:* EDEC 4840.

**EDEC 4850 Early Childhood Capstone** 3 (3) Taken concurrently with student teaching. Students strengthen connections between theory and pedagogy; analyze and solve contemporary problems in early childhood education; and reflect upon their personal growth as educators. *Preq:* EDEC 4000 and EDEC 4300 and EDEC 4400 and EDEC 4600. *Coreq:* EDEC 4840.

## ELEMENTARY EDUCATION

*Professor:* D.P. Reinking, D.A. Smith; *Associate Professors:* D.B. Fleming, M.J. Spearman; *Assistant Professors:* M.W. Cole, C.C. Deaton, A. Leonard, J. Malloy, A.M. Tyminski; *Clinical Faculty:* R.A. Kaminski; *Lecturer:* W.E. Holton

**EDEL 3040 Instructional Planning, Management, and Communications** 3 (3) Provides students with knowledge and techniques for short- and long-term planning of developmentally appropriate lessons. Students learn how to structure ADEPT lessons and activities to meet the needs of students; and learn techniques for time and behavior management, organization and effective communication with school audiences. *Preq:* EDF 3340 and admission to the professional level.

**EDEL 3100 Arts in the Elementary School** 3 (2) Introduces skills, theories and practices used to integrate visual arts, drama, music and dance in the elementary classroom. Emphasizes philosophies associated with art education, content information, curriculum for diverse learners, and use of tools, media, materials and techniques. *Preq:* Admission to Elementary Education, Special Education or Early Childhood Education majors. *Coreq:* EDEL 3101.

**EDEL 3101 Arts in the Elementary School Laboratory** 0 (3) Non-credit laboratory to accompany EDEL 3100. *Coreq:* EDEL 3100.

**EDEL 3110 Teaching Diverse Populations** 3 (3) Preservice teachers examine the role of teachers as they relate to culturally appropriate curricula, instruction, and evaluation. *Preq:* Admission to the professional level.

**EDEL 3210 Physical Education Methods and Content for Classroom Teachers** 3 (3) Provides education majors with a basic understanding of the methods and techniques utilized in teaching elementary physical education. Emphasizes acquiring a basic understanding of the movement education approach and the ability to teach integrated lessons utilizing this approach. *Preq:* Junior standing; and admission to the professional level; and EDF 3020 and EDF 3340. *Preq or concurrent enrollment:* EDEL 3100.

**EDEL 4010 Elementary Field Experience** 3 (1) Practical classroom experience prior to the student teaching semester for Elementary Education majors. For a twelve-week period, students spend two days per week in schools observing, tutoring individuals, conducting small group activities, and teaching the class. Students attend seminars on topics related to field experience. *Preq:* EDF 3340 and EDEL 3100 and EDEL 3210 and EDEL 4520, and admission to the professional level. *Coreq:* EDEL 4011 and EDEL 4510 and EDEL 4870 and EDEL 4880 and EDLT 4610.

**EDEL 4011 Elementary Field Experience Laboratory** 0 (6) Non-credit laboratory to accompany EDEL 4010. *Coreq:* EDEL 4010.

**EDEL 4050 Social Justice and 21st Century Learners** 3 (3) Using an integrated focus approach to social justice education, preservice teachers investigate an educational event and/or issue through a combination of race, gender or socioeconomic factors. Preservice teachers write personal classroom stories related to practice/praxis; and use technology to document stories of themselves, their mentor and/or their teacher education preparation. *Preq:* Admission to the professional level. *Coreq:* EDEL 4670 and EDLT 4620 and EDLT 4630.

**EDEL 4510 Elementary Methods in Science Teaching** 3 (2) Development of process skills, technical skills, and attitudes needed to foster increased confidence and commitment to the teaching of elementary science, with emphasis on teaching strategies and techniques and their implications for what we know of how children learn science. Includes Honors sections. *Preq:* BIOL 1090 and PHSC 1170 and PHSC 1180; and admission to the professional level. *Coreq:* EDEL 4511 and EDEL 4610 and EDEL 4870 and EDEL 4880 and EDLT 4610.

**EDEL 4511 Elementary Methods in Science Teaching Laboratory** 0 (3) Non-credit laboratory to accompany EDEL 4510. *Coreq:* 4510.

**EDEL 4520 Elementary Methods in Mathematics Teaching** 3 (2) Special emphasis is given to the development of understanding, skills, and attitudes in the elementary curriculum with focus on strategies, techniques, and materials for teaching elementary mathematics. *Preq:* MATH 1150 and MATH 1160 and MATH 2160 and MATH 3160; and admission to the professional level. *Coreq:* EDEL 4521 and EDLT 4620.

**EDEL 4521 Elementary Methods in Mathematics Teaching Laboratory** 0 (3) Non-credit laboratory to accompany EDEL 4520. *Coreq:* EDEL 4520.

**EDEL 4580 Health Education Methods and Content for the Classroom Teacher** 3 (3) Study of the content, methodology, and resource materials necessary for teaching comprehensive health education in public schools. Emphasizes the National Health Education Standards and the health behaviors of youth that are allied with the Coordinated School Health Program. *Preq:* Minimum grade-point average of 2.0.

**EDEL 4670 Principles and Strategies for Teaching English to Speakers of Other Languages in Elementary Schools** 3 (3) Introduces preservice teachers to theories and principles related to second language acquisition as applied in culturally and linguistically responsive classrooms. Presents instructional models and strategies for teaching the language acquisition process within a context of academics supportive of English language learners (ELLs) and their needs. *Preq:* Admission to the professional level. *Coreq:* EDEL 4050 and EDLT 4620 and EDLT 4630.

**EDEL 4810 Directed Teaching in the Elementary School** 12 (1) Supervised observation and teaching experiences in cooperation with selected elementary schools. Restricted to seniors or graduates who have completed prerequisite courses. *Preq:* EDEL 3210 and EDEL 4010 and EDEL 4510 and EDEL 4520 and EDEL 4870 and EDEL 4880 and EDLT 4610; admission to the professional level; and consent of area committee chair. *Coreq:* EDEL 4811.

**EDEL 4811 Directed Teaching in the Elementary School Laboratory** 0 (33) Non-credit laboratory to accompany EDEL 4810. *Coreq:* EDEL 4810.

**EDEL 4820 Capstone Seminar in Elementary Teaching** 3 (3) Students strengthen connections between theory and pedagogy; analyze and solve contemporary problems in elementary education; and reflect upon their personal growth as educators within a social justice framework. *Preq:* EDEL 3100 and EDEL 3210 and EDEL 4010 and EDEL 4510 and EDEL 4520 and EDEL 4870 and EDEL 4880 and EDLT 4610; and admission to the professional level; and consent of area committee chair. *Coreq:* EDEL 4830.

**EDEL 4830 Directed Teaching in the Elementary School** 9 (27) Supervised observation and teaching experience in cooperation with selected elementary schools. Restricted to seniors or graduates who have completed prerequisite courses. *Preq:* EDEL 3100 and EDEL 3210 and EDEL 4010 and EDEL 4510 and EDEL 4520 and EDEL 4870 and EDEL 4880 and EDLT 4610; and admission to the professional level; and consent of area committee chair. *Coreq:* EDEL 4820.

**EDEL 4870 Elementary Methods in Social Studies Teaching** 3 (2) Introduction to methods, materials, and techniques needed to teach social studies in the elementary schools. *Preq:* GEOG 1030; and HIST 1010 or HIST 1020; and admission to the professional level. *Coreq:* EDEL 4010 and EDEL 4510 and EDEL 4871 and EDEL 4880 and EDLT 4610.

**EDEL 4871 Elementary Methods in Social Studies Teaching Laboratory** 0 (3) Non-credit laboratory to accompany EDEL 4870. *Coreq:* EDEL 4870.

**EDEL 4880 Elementary Methods in Language Arts Teaching** 3 (2) Introduction for pre-service teachers to the skills of the language arts other than reading and the methods, materials, and techniques needed to teach these skills to students in the elementary school. *Preq:* ENGL 1030 or ENGL 3850; and admission to the professional level. *Coreq:* EDEL 4010 and EDEL 4510 and EDEL 4870 and EDEL 4881 and EDLT 4610.

**EDEL 4881 Elementary Methods in Language Arts Teaching Laboratory** 0 (3) Non-credit laboratory to accompany EDEL 4880. *Coreq:* EDEL 4880.

**EDUCATIONAL FOUNDATIONS**

*Professors:* D.E. Barrett, R.P. Green Jr., D.M. Switzer;  
*Associate Professor:* S. N. Rosenblith, *Chair;* *Assistant Professors:* D.M. Boyer, D. Hero, F. Jamil, M. Qian, G. Ring P. Vargas; *Clinical Faculty:* R.D. Visser

**EDF 3010 Principles of American Education 3 (3)** Study of the legal basis, historical development, characteristics, and functions of educational institutions in the United States. Includes Honors sections. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.

**EDF 3020 Educational Psychology 3 (3)** Introduction to classroom use of objectives, motivation theories, learning theories, tests and measurements, classroom management, and knowledge of exceptional learners. Includes Honors sections. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.

**EDF 3080 Classroom Assessment 3 (3)** Introduction to classroom assessment and standardized testing. *Preq:* EDF 3020.

**EDF 3150 Technology Skills for Learning 1 (2)** Students develop technology skills, such as creating Web pages and multimedia presentations in the context of general education class requirements. Products developed are linked within the School of Education e-portfolio. May also be offered as CTE 3150. *Preq:* Admission to Teacher Education program and ED 1050.

**EDF 3200 History of United States Public Education 3 (3)** Historical survey of the development of United States public schools. May also be offered as HIST 3200. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.

**EDF 3340 Child Growth and Development 3 (3)** Introduction to lifespan development. Heavy emphasis is placed on the physical, social, emotional, and cognitive characteristics. Includes a minimum of five one-hour observation-participation visits to an elementary school. Includes Honors sections. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.

**EDF 3350 Adolescent Growth and Development 3 (3)** Introduction to lifespan development. Emphasizes the physical, social, emotional, and cognitive characteristics of the 10- to 18-year old and the educational implications of those developmental characteristics. Includes Honors sections. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.

**EDF 4060 Philosophy, Schooling, and Educational Policy 3 (3)** Analysis of the development of contemporary educational theory and its impact on current schooling practices and educational policy development.

**EDF 4250 Instructional Technology Strategies 1 (2)** Helps future teachers learn to use technology effectively in support of content area instruction. To be taken concurrently with either methods classes or during student teaching as directed by major. *Preq:* EDF 3150 or EDF 4800.

**EDF 4800\* Foundations of Digital Media and Learning 3 (2)** Critical use of digital media for leadership and learning within societal and educational contexts. Course focuses on learner impact while exploring, developing, and evaluating technology-enhanced applications. Further develops competencies with new media literacies and addresses societal, cultural, ethical, and participatory issues and uses of digital media. Registration preference may be given to students enrolled in a teacher education program. *Coreq:* EDF 4801.

**EDF 4801\* Foundations of Digital Media and Learning Laboratory 0 (2)** Non-credit laboratory to accompany EDF 4800. *Coreq:* EDF 4800.

**EDF 4820\* Advanced Educational Applications of Microcomputers 3 (2)** Provides students with the knowledge and skills needed to apply microcomputer technology to the utilization and generation of educational software in accordance with sound educational principles. *Preq:* AGED 4800 or EDF 4800. *Coreq:* EDF 4821.

**EDF 4821\* Advanced Educational Applications of Microcomputers Laboratory 0 (2)** Non-credit laboratory to accompany EDF 4820. *Coreq:* EDF 4820.

**EDF 4900\* Classroom Management 3 (3)** Aids students in developing strategies and plans to manage a classroom effectively. Topics include both time and behavioral management. Students learn how to prevent problems as well as address problems once they have occurred. Includes Honors sections. *Preq:* EDF 3020 or PSYC 2010; and EDF 3340 or EDF 3350; and a 2.0 minimum grade-point average; or graduate standing.

**EDF 4970\* Instructional Media in the Classroom 3 (3)** Integrated approach to the use of audiovisual media stressing systematic planning, selection, utilization, and evaluation as well as production of materials and equipment operation. *Preq:* 2.0 minimum grade-point average.

**LITERACY**

*Professor:* L.B. Gambrell; *Associate Professors:* P.J. Dunston, S.K. Fullerton, J.C. McNair; *Assistant Professor:* C.C. Bates; *Visiting Lecturer:* M.A. McBride

**EDLT 1030 Learning Strategies 2 (3)** Students learn strategies of active learning and critical thinking skills, which become an integral part of their natural thinking processes. Students learn how to generalize and apply newly acquired strategies to a variety of settings and situations.

**EDLT 4580 Early Literacy: From Birth to Kindergarten 3 (3)** Provides Early Childhood Education majors with knowledge of theory and research-based, developmentally appropriate instructional practices related to children's literacy development within the home and school from birth to kindergarten. Factors related to assessment and communication within and between the family, school, and teacher are addressed. *Preq:* Admission to the professional level.

**EDLT 4590 Teaching Reading in the Early Grades: K-3 3 (3)** Provides early childhood and Elementary Education majors an understanding of teaching reading in the elementary school setting in kindergarten through third grade. Students investigate general principles of language and literacy development and learn methods for teaching and assessing children's literacy. *Preq:* EDEC 3360 and EDF 3010 and EDF 3020 and admission to the professional level. Early Childhood Education majors must enroll in EDEC 4000 and EDLT 4590 during the same term.

**EDLT 4600 Teaching Reading in the Elementary Grades: 2-6 3 (3)** Provides preservice teachers with an understanding of teaching reading in the elementary setting in grades 2-6. Students investigate general principles of language and literacy development and learn methods for teaching and assessing children's literacy. *Preq:* EDF 3010 and EDF 3020 and EDF 3340 and admission to the professional level.

**EDLT 4610 Content Area Reading: Grades 2-6 3 (2)** Provides preservice teachers with an understanding of teaching content area literacy in grades 2-6. Students learn methods and strategies for teaching children to learn with and make use of expository texts. Comprehension, the role of expository texts, and vocabulary learning in content areas are presented. *Preq:* EDLT 4600 and admission to the professional level. *Coreq:* EDLT 4611. Elementary Education majors must enroll in EDLT 4610 and EDEL 4510 and EDEL 4610 and EDEL 4870 and EDEL 4880 during the same term.

**EDLT 4611 Content Area Reading: Grades 2-6 Laboratory 0 (3)** Non-credit laboratory to accompany EDLT 4610. *Coreq:* EDLT 4610.

**EDLT 4620 Reading and Responding to Children's Literature in the Elementary Classroom 3 (3)** Introduces children's literature across genres. Participants examine strategies for responding to children's literature through various modes and explore cultural issues and controversies related to children's literature. *Preq:* EDLT 4600 and admission to the professional level. *Coreq:* EDEL 4520.

**EDLT 4630 Teaching Reading and Writing to English Language Learners 3 (3)** Within a framework of the dimensions of cross-cultural knowledge and knowledge of theories and principles related to second language acquisition, participants develop understanding of the reading and writing processes and instructional models, strategies and tools that offer supportive learning for English language learners. *Preq:* EDLT 4600 and admission to the professional level.

**EDLT 4980 Secondary Content Area Reading 3 (2)** Designed for preservice teachers who are involved with field experiences prior to student teaching full time. Prepares content area teachers to teach the reading skills necessary for effective teaching of content area material. *Preq:* Admission to professional level. *Coreq:* EDLT 4981.

**EDLT 4981 Secondary Content Area Reading Laboratory 0 (2)** Non-credit laboratory to accompany EDLT 4980. *Coreq:* EDLT 4980.

**SECONDARY EDUCATION**

*Professor:* R.M. Horton; *Associate Professor:* J.C. Marshall; *Assistant Professors:* S.M. Che, M.P. Cook, J.C. Marshall; *Assistant Professors:* S. Cridland-Hughes, L.J. King; *Clinical Faculty:* C.L. Haltiwanger

- EDSC 2260 A Professional Approach to Secondary Algebra 3 (3)** Focuses on the pedagogical content knowledge needed to teach algebra effectively. It helps students master algebraic concepts, connections and representations at a deep level and solve meaningful real world problems. Students also explore the history of mathematical and algebraic thought and create meaningful and engaging lessons. *Preq:* Secondary Education major in Mathematics Teaching Area or Mathematics Teaching major.
- EDSC 3240 Practicum in Secondary English 3 (2)** Pre-service secondary English teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school English teachers. *Coreq:* EDSC 3241.
- EDSC 3241 Practicum in Secondary English Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 3240. *Coreq:* EDSC 3240.
- EDSC 3260 Practicum in Secondary Mathematics 3 (2)** Pre-service secondary mathematics teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school mathematics teachers. *Coreq:* EDSC 3261.
- EDSC 3261 Practicum in Secondary Mathematics Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 3260. *Coreq:* EDSC 3260.
- EDSC 3270 Practicum in Secondary Science 3 (2)** Pre-service secondary science teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school science teachers. *Coreq:* EDSC 3271.
- EDSC 3271 Practicum in Secondary Science Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 3270. *Coreq:* EDSC 3270.
- EDSC 3280 Practicum in Secondary Social Studies 3 (2)** Pre-service secondary social studies teachers gain both content and pedagogical knowledge by observing and reflecting upon the classroom practices of selected in-service high school social studies teachers. *Coreq:* EDSC 3281.
- EDSC 3281 Practicum in Secondary Social Studies Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 3280. *Coreq:* EDSC 3280.
- EDSC 4120 Directed Student Teaching in Secondary School Subjects 12 (1)** Program of supervised observation and teaching in cooperation with selected public schools. Opportunities are provided for prospective teachers to obtain experiences in the subject area. Students are sectioned according to teaching fields: English, social science, mathematical sciences, modern languages, science. Enrollment is limited. *Coreq:* EDSC 4121.
- EDSC 4121 Directed Student Teaching in Secondary School Subjects Laboratory 0 (33)** Non-credit laboratory to accompany EDSC 4120. *Coreq:* EDSC 4120.
- EDSC 4170 Teaching Internship in the Secondary School 6 (16)** Full-time, supervised teaching internship for one semester in cooperation with a participating South Carolina secondary school. Reserved for students seeking certification in critical-need teaching areas. May be repeated for a maximum of 12 credits. To be taken Pass/No Pass only. *Preq:* EDF 3010 and EDF 3020 and EDF 3350 and EDLT 4980; and one of the following: EDSC 4240, 4250, 4260, 4270; and consent of School of Education by way of approving student's application.
- EDSC 4240 Teaching Secondary English 3 (2)** Development of instructional practices and materials appropriate for secondary English; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. Taught fall semester only. Includes Honors sections. *Preq:* Second semester Junior standing, admission to the professional level, ED 1050 and EDF 3010 and EDF 3020 and EDF 3350; at least 18 hours of English coursework and a minimum grade-point average of 2.5. *Preq or concurrent enrollment:* EDLT 4980. *Coreq:* EDSC 4241.
- EDSC 4241 Teaching Secondary English Laboratory 0 (2)** Non-credit laboratory to accompany EDSC 4240. *Coreq:* EDSC 4240.
- EDSC 4250 Teaching Secondary Modern Languages 3 (2)** Development of instructional practices and materials appropriate for secondary modern languages; familiarization with curriculum materials; includes field experiences in local schools. Taught fall semester only. *Preq:* Second semester Junior standing, admission to the professional level, ED 1050 and EDF 3010 and EDF 3020 and EDF 3350; at least 18 hours of English coursework and a minimum grade-point average of 2.5. *Preq or concurrent enrollment:* EDLT 4980. *Coreq:* EDSC 4251.
- EDSC 4251 Teaching Secondary Modern Languages Laboratory 0 (2)** Non-credit laboratory to accompany EDSC 4250. *Coreq:* EDSC 4250.
- EDSC 4260 Teaching Secondary Mathematics 3 (2)** Development of instructional practices appropriate for secondary mathematics; familiarization with curriculum materials, planning, and implementation of lessons; includes field experiences in local schools. Taught fall semester only. Includes Honors sections. *Preq:* Admission to the professional level, ED 1050 and EDF 3010 and EDF 3020 and EDF 3350; at least 18 hours of English coursework and a minimum grade-point average of 2.5. *Preq or concurrent enrollment:* EDLT 4980. *Coreq:* EDSC 4261.
- EDSC 4261 Teaching Secondary Mathematics Laboratory 0 (2)** Non-credit laboratory to accompany EDSC 4260. *Coreq:* EDSC 4260.
- EDSC 4270 Teaching Secondary Science 3 (2)** Development of instructional practices and materials for teaching secondary school science (biological, earth, and physical sciences); familiarization with secondary science curriculum materials; includes field experiences in local schools. Taught fall semester only. Includes Honors sections. *Preq:* Second semester Junior standing, admission to the professional level, ED 1050 and EDF 3010 and EDF 3020 and EDF 3350; at least 18 hours of English coursework and a minimum grade-point average of 2.5. *Preq or concurrent enrollment:* EDLT 4980. *Coreq:* EDSC 4271.
- EDSC 4271 Teaching Secondary Science Laboratory 0 (2)** Non-credit laboratory to accompany EDSC 4270. *Coreq:* EDSC 4270.
- EDSC 4280 Teaching Secondary Social Studies 3 (2)** Development of instructional practices and materials appropriate for secondary social studies; familiarization with curriculum materials; includes field experiences in local schools in preparation for student teaching. Taught fall semester only. Includes Honors sections. *Preq:* Second semester Junior standing, admission to the professional level, ED 1050 and EDF 3010 and EDF 3020 and EDF 3350; at least 18 hours of English coursework and a minimum grade-point average of 2.5. *Preq or concurrent enrollment:* EDLT 4980. *Coreq:* EDSC 4281.
- EDSC 4281 Teaching Secondary Social Studies Laboratory 0 (2)** Non-credit laboratory to accompany EDSC 4280. *Coreq:* EDSC 4280.
- EDSC 4370\* Technology in Secondary Mathematics 3 (3)** Students learn how to integrate calculators, data collectors, and computers in the secondary mathematics curriculum. They solve problems from middle school, Algebra I, Geometry, and Algebra II courses. *Preq:* Second semester Junior standing, admission to the professional level.
- EDSC 4440 Teaching Internship in Secondary English 9 (27)** Interns design, implement, and critically reflect upon instructional units and teaching practices in supervised secondary English classes. Interns must provide evidence of performance that meets national and state teaching standards for secondary English. Taught spring semester only. *Preq:* EDSC 4240. *Coreq:* EDSC 4540.
- EDSC 4460 Teaching Internship in Secondary Mathematics 9 (27)** Prospective secondary mathematics teachers apply teaching and learning theories in a field-based setting through an internship in a secondary public school classroom. Taught spring semester only. *Preq:* EDSC 4260. *Coreq:* EDSC 4560.
- EDSC 4470 Teaching Internship in Secondary Science 9 (27)** Supervised teaching internship in assigned secondary public school science classroom. Meets part of requirement for S.C. science teaching certification. Taught spring semester only. *Preq:* EDSC 4270. *Coreq:* EDSC 4570.
- EDSC 4480 Teaching Internship in Secondary Social Studies 9 (27)** Supervised observation and teaching in cooperation with a mentor teacher in a secondary public school. Students design, implement, and critically reflect upon curricular and instructional practices in public secondary social studies classrooms. Taught spring semester only. *Preq:* EDSC 4280. *Coreq:* EDSC 4580.
- EDSC 4540 Secondary English Capstone Seminar 3 (2)** Seminar in conjunction with EDSC 4440. Interns reflect upon and solve problems regarding teaching events, share effective teaching practices, and devise ways to document dimensions of effective teaching. Taught spring semester only. *Preq:* EDSC 4240. *Coreq:* EDSC 4440 and EDSC 4541.
- EDSC 4541 Secondary English Capstone Seminar Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 4540. *Coreq:* EDSC 4540.
- EDSC 4560 Secondary Mathematics Capstone Seminar 3 (2)** Capstone seminar accompanying supervised secondary mathematics teaching internship. Satisfies part of the requirements for South Carolina secondary certification. Taught spring semester only. *Preq:* EDSC 4260. *Coreq:* EDSC 4460 and EDSC 4561.

- EDSC 4561 Secondary Mathematics Capstone Seminar Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 4560. *Coreq:* EDSC 4560.
- EDSC 4570 Secondary Science Capstone Seminar 3 (2)** Capstone seminar accompanying supervised high school science teaching internship. Satisfies part of requirement for South Carolina secondary science certification. Offered spring semester only. *Preq:* EDSC 4270. *Coreq:* EDSC 4470 and EDSC 4571.
- EDSC 4571 Secondary Science Capstone Seminar Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 4570. *Coreq:* EDSC 4570.
- EDSC 4580 Secondary Social Studies Capstone Seminar 3 (2)** Capstone seminar accompanying supervised high school social studies teaching internship. Satisfies part of requirement for S.C. secondary certification. Offered spring semester only. *Preq:* EDSC 4280. *Coreq:* EDSC 4480 and EDSC 4581.
- EDSC 4581 Secondary Social Studies Capstone Seminar Laboratory 0 (3)** Non-credit laboratory to accompany EDSC 4580. *Coreq:* EDSC 4580.
- EDSC 4820\* Laboratory Techniques for Teaching Science 3 (1)** Focuses on basic lab skills needed to plan, prepare, and conduct inquiry-based laboratories and to familiarize pre-service teachers with a variety of scientific equipment and their methodologies. Topics include ways to integrate technology into the classroom, lab safety, and the development of inquiry-based classroom activities. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* EDSC 4821. May also be offered as BIOL 4820.
- EDSC 4821\* Laboratory Techniques for Teaching Science Laboratory 0 (6)** Non-credit laboratory to accompany EDSC 4820. *Coreq:* EDSC 4820. May also be offered as BIOL 4821.
- EDSC 4850\* Composition and Language Studies for Teachers 3 (3)** Examines the principles and practices of composing and teaching composition. Includes a historical study of English language with attention to phonology, morphology, syntax, semantics, and practical aspects of language grammars. Serves as a practicum in composing and assessing processes, collaborative learning, writers purposes, audience expectations, and language conventions. May also be offered as ENGL 4850. *Preq:* ENGL 3100.
- SPECIAL EDUCATION**  
*Professors:* A. Katsiyannis, P.M. Stecker; *Associate Professors:* M.J. Hodge, J.B. Ryan; *Assistant Professors:* R. Ennis, J. Farmer, S.M. Mackiewicz; *Clinical Faculty:* B. Romansky
- EDSP 3700 Introduction to Special Education 3 (3)** Survey of students with disabilities and with gifts/talents. Individuals with Disabilities Education Act is emphasized, including general educator's role in serving students with special needs. Characteristics, assessment, and effective instructional procedures for students of varying exceptionalities are addressed. Includes Honors sections. Students must have a minimum grade-point average of 2.0 to enroll in this course.
- EDSP 3720 Characteristics and Instruction of Individuals with Learning Disabilities 3 (3)** In-depth coverage of characteristics and identification procedures for individuals with learning disabilities. Effective instructional strategies are addressed. Students participate in field experiences throughout the semester. Offered fall semester only. *Preq:* EDSP 3700. *Coreq:* EDSP 3721 and EDSP 3740.
- EDSP 3721 Characteristics and Instruction of Individuals with Learning Disabilities Laboratory 0 (1)** Non-credit laboratory to accompany EDSP 3720. *Coreq:* EDSP 3720.
- EDSP 3730 Characteristics and Instruction of Individuals with Intellectual Disabilities and Autism 3 (3)** In-depth study of the etiology, assessment procedures, learning and behavioral characteristics, and effective instructional strategies related to the education of individuals with intellectual disabilities and autism. Students participate in a field experience throughout the semester. *Preq:* EDSP 3720 and EDSP 3740; and admission to professional level. *Preq or concurrent enrollment:* EDSP 3750. *Coreq:* EDSP 3731 and EDSP 4910.
- EDSP 3731 Characteristics and Instruction of Individuals with Intellectual Disabilities and Autism Laboratory 0 (1)** Non-credit laboratory to accompany EDSP 3730. *Coreq:* EDSP 3730.
- EDSP 3740 Characteristics and Strategies for Individuals with Emotional/Behavioral Disorders 3 (3)** In-depth coverage of characteristics and identification procedures for individuals with emotional or behavioral disorders. Effective instructional strategies and behavior management are addressed. Students participate in field experiences throughout the semester. *Preq:* EDSP 3700; and admission to professional level. *Coreq:* EDSP 3720 and EDSP 3741.
- EDSP 3741 Characteristics and Strategies for Individuals with Emotional/Behavioral Disorders Laboratory 0 (1)** Non-credit laboratory to accompany EDSP 3740. *Coreq:* EDSP 3740.
- EDSP 3750 Early Intervention Strategies for Young Children with Special Needs 3 (3)** Provides students with a working knowledge of the history and legal precedence for providing early intervention services, the characteristics of young children with special needs and their families, and effective instructional techniques for working with this population. Students participate in field experiences throughout the semester. *Preq:* EDSP 3700. *Coreq:* EDSP 3751.
- EDSP 3751 Early Intervention Strategies for Young Children with Special Needs Laboratory 0 (1)** Non-credit laboratory to accompany EDSP 3750. *Coreq:* EDSP 3750.
- EDSP 4910 Educational Assessment of Individuals with Disabilities 3 (2)** Introduction to assessment process (verification) in special education. Includes procedural safeguards; data collections via informal and standardized procedures; issues in assessment; psychometric properties of standardized tests; and administration, scoring, and interpretation of selected instruments. Offered spring semester only. *Preq:* EDSP 3720 and EDSP 3740; and admission to the professional level. *Coreq:* EDSP 3730 and EDSP 4911.
- EDSP 4911 Educational Assessment of Individuals with Disabilities Laboratory 0 (2)** Non-credit laboratory to accompany EDSP 4910. *Coreq:* EDSP 4910.
- EDSP 4920 Mathematics Instruction for Individuals with Mild Disabilities 3 (3)** Prepares students to provide explicit instruction in mathematics for individuals with mild disabilities. Students learn to assess, analyze and teach math skills systematically. Offered fall semester only. *Preq:* EDSP 4910; and admission to the professional level. *Coreq:* EDSP 4930 and EDSP 4940 and EDSP 4960 and EDSP 4970.
- EDSP 4930 Classroom and Behavior Management for Special Educators 3 (3)** Students describe various intervention strategies for increasing and maintaining appropriate behaviors and for decreasing or eliminating inappropriate behaviors. Students accurately recognize, record, and chart inappropriate behaviors; employ the least restrictive intervention; foster self-management skills; and develop preventive strategies and classwide systems for managing academic and social behavior. Offered fall semester only. *Preq:* EDSP 4910; and admission to the professional level. *Coreq:* EDSP 4920 and EDSP 4940 and EDSP 4960 and EDSP 4970.
- EDSP 4940 Teaching Reading to Students with Mild Disabilities 3 (3)** Emphasizes the knowledge and skills necessary for teaching reading to students with mild disabilities. Offered fall semester only. *Preq:* EDSP 4910; and admission to the professional level. *Coreq:* EDSP 4920 and EDSP 4930 and EDSP 4960 and EDSP 4970.
- EDSP 4950 Communication and Collaboration in Special Education 3 (3)** Focuses on effective communication skills for preservice special education teachers to encourage collaboration among relevant stakeholders and improve outcomes for individuals with disabilities. *Preq:* EDSP 4960. *Coreq:* EDSP 4980.
- EDSP 4960 Special Education Field Experience 3 (9)** Supervised practical experience prior to Directed Teaching for preservice special education teachers preparing to teach individuals with mild/moderate disabilities. Offered fall semester only. *Preq:* EDSP 4910; and admission to the professional level. *Coreq:* EDSP 4920 and EDSP 4930 and EDSP 4940 and EDSP 4970.
- EDSP 4970 Secondary Methods for Individuals with Disabilities 3 (3)** Preparation for working with students with mild/moderate disabilities in secondary schools. Focus is on literature, methods, and materials for providing instruction in transition, self-determination, knowledge within content areas, functional skills, and integration into the community. Offered fall semester only. *Preq:* EDSP 4910; and admission to the professional level. *Coreq:* EDSP 4920 and EDSP 4930 and EDSP 4940 and EDSP 4960.
- EDSP 4980 Directed Teaching in Special Education 12 (34)** Comprehensive course providing a full-time, semester-long experience for preservice special education teachers who plan to teach individuals with mild/moderate disabilities. Generally the last course in the program; provides teaching experience under the supervision of University and school personnel. Offered spring semester only. *Preq:* EDSP 4960 *Coreq:* EDSP 4950.

## ENVIRONMENTAL ENGINEERING AND SCIENCE

*Professors:* T.A. DeVol, D.L. Freedman, T.J. Overcamp, M.A. Schlautman; *Associate Professors:* E.R. Carraway, K.T. Finneran, B.A. Powell; *Assistant Professor:* D.A. Ladner

**EES 2010 Environmental Engineering Fundamentals I** 3 (3) Overview of topics and engineering application areas that comprise the environmental engineering profession. Significant emphasis is given to development of oral and written communication skills needed by the engineering professional and application of engineering fundamentals to environmental systems. *Preq:* CH 1010 and MATH 1080 and ENGR 1060, each with a grade of C or better. *Preq or concurrent enrollment:* CHE 1300 or ENGR 1070.

**EES 2020 Environmental Engineering Fundamentals II** 4 (3) Overview of fundamentals related to environmental engineering processes, including water treatment, wastewater treatment, solid and hazardous waste management, air pollution control, risk assessment, and pollution prevention strategies. Laboratories cover measurement techniques and applications to process engineering. *Preq:* CH 1020; and EES 2010; and CHE 1300 or ENGR 1090. Students must have a C or better in ENGR 1090 to meet the prerequisite requirement. *Coreq:* EES 2021.

**EES 2021 Environmental Engineering Fundamentals II Laboratory** 0 (3) Non-credit laboratory to accompany EES 2020. *Coreq:* EES 2020.

**EES 3000 Honors Seminar: Introduction to Research in Environmental Engineering I** (1) Provides an introduction to environmental engineering research. Students attend seminars describing how a research program is developed, including the scientific method and hypothesis testing. Students are expected to write and revise a research proposal, which is reviewed by the faculty advisor. *Preq:* Consent of instructor and membership in Calhoun Honors College.

**EES 3010 Honors Research in Environmental Engineering I** 3 (9) In this portion of the undergraduate honors research program in environmental engineering, students begin their environmental engineering research project. *Preq:* EES 3000 and consent of instructor and membership in the Calhoun Honors College.

**EES 3030 Water Treatment Systems 2** (2) Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water treatment. Introduces the integration of unit operations and processes into water treatment systems. *Preq:* EES 2020. *Coreq:* EES 3040 and EES 3050.

**EES 3040 Wastewater Treatment Systems 2** (2) Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in wastewater treatment. Both physiochemical and biological treatment techniques are discussed. Introduces the integration of unit operations and processes into wastewater treatment systems. *Preq:* EES 2020. *Coreq:* EES 3030 and EES 3050.

**EES 3050 Water and Wastewater Treatment Laboratory I** 3 (3) Laboratory exercises to accompany EES 3030 and EES 3040 in selected water and wastewater treatment operations and processes. Emphasis is on understanding of fundamental principles and operational procedures, experimental design, data analysis, use of experimental data in engineering design applications, and writing of engineering reports. *Preq:* EES 2020. *Coreq:* EES 3030 and EES 3040.

**EES 4000 Honors Research in Environmental Engineering II** 3 (9) Continuation of EES 3010. Students continue research work on their honors environmental engineering project. *Preq:* EES 3010 and consent of instructor and membership in the Calhoun Honors College.

**EES 4010\* Environmental Engineering** 3 (3) Introduction to the field of environmental engineering. Topics include environmental phenomena, impact of pollutants in the aquatic environment, solid-waste management, air pollution control, radiological health, and simple water and wastewater treatment systems. *Preq:* Junior standing in engineering or consent of instructor. *Preq:* Junior standing in the College of Engineering and Science. *Preq or concurrent enrollment:* CE 3410 or CHE 2300 or ME 3080; or GEOL 4820 and either GEOL 4150 or MATH 2060.

**EES 4020\* Water and Waste Treatment Systems** 3 (3) Study of fundamental principles, rational design considerations, and operational procedures of the unit operations and processes employed in water and waste treatment. Both physiochemical and biological treatment techniques are discussed. Introduces the integration of unit operations and processes into water and waste treatment systems. *Preq:* EES 2020 or EES 4010.

**EES 4100\* Environmental Radiation Protection I** 3 (3) Fundamental principles of radiological health and radiation safety. Topics include radiation fundamentals, basic concepts of environmental radiation protection, internal and external dosimetry, environmental dose calculations and radiation protection standards. *Preq:* PHYS 2210 with a grade of C or better.

**EES 4110\* Ionizing Radiation Detection and Measurement** 3 (2) Laboratory exercises in ionizing radiation detection and measurements. Topics include nuclear electronics; counting statistics; radiation interactions; basic gas, scintillation, and semiconductor detectors; gamma-ray spectroscopy; health physics survey instrumentation; and thermoluminescent dosimetry. *Preq:* EES 4100. *Coreq:* EES 4111.

**EES 4111\* Ionizing Radiation Detection and Measurement Laboratory** 0 (3) Non-credit laboratory to accompany EES 4110. *Coreq:* EES 4110.

**EES 4300\* Air Pollution Engineering** 3 (3) Introductory course in air pollution and its control. Topics include air pollutants and effects, sources, dispersion models, engineering controls, and air-quality legislation. *Preq:* EES 2020 or EES 4010.

**EES 4370\* Biodegradation and Bioremediation** 3 (3) Basic principles of biodegradation for major classes of organic and inorganic contaminants, including halogenated aliphatic and aromatic compounds, fuel hydrocarbons, pesticides and nitrated energetic compounds, metals, and radionuclides. The basic science of microbiology and chemistry, and how these are used to develop bioremediation strategies and technologies, are discussed. *Preq:* One of EES 2020 or EES 4010; and one of CH 2010 or CH 2230; and one of MICR 3050 or MICR 4130.

**EES 4500 Professional Seminar** 1 (1) Covers various topics related to skills and techniques for evaluating career opportunities, seeking and obtaining environmental engineering employment, career development, professional registration, professional ethics, and other factors necessary for achieving success in a professional career. Course enables students to make decisions that will help them succeed in their careers. *Preq or concurrent enrollment:* EES 4020 and EES 4030 and EES 4300.

**EES 4510\* Newman Seminar and Lecture Series in Natural Resources Engineering** 1 (2) Topics dealing with development and protection of land, air, water, and related resources are covered by seminar with instructor and invited lecturers. Current environmental and/or resource conservation issues are addressed. Includes Honors sections. May also be offered as BE 4510 or FOR 4510. *Preq:* Senior standing.

**EES 4750 Capstone Design Project** 3 (1) Students apply creativity and their engineering knowledge to solve open-ended environmental engineering problems. Problems are formulated and solutions are evaluated by faculty and practicing engineers. Oral and written communication skills are developed through presentations, correspondence and project reports. *Preq:* CE 3410 and EES 4020 and EES 4030 and EES 4300. *Coreq:* EES 4751.

**EES 4751 Capstone Design Project Laboratory** 0 (6) Non-credit laboratory to accompany EES 4750. *Coreq:* EES 4750.

**EES 4800\* Environmental Risk Assessment** 3 (3) Quantitative estimation of human health risk posed by the release of a contaminant to the environment. Topics include methods for analyzing emission rate, environmental transport, exposure, and health effects; methods of uncertainty analysis; and the role of risk assessment in environmental regulation and environmental decision making. *Preq:* EES 2020 or EES 4010; and MTHS 2080 with a grade of C or better.

**EES 4840\* Municipal Solid Waste Management** 3 (3) Introduction to the problems, regulations, collection, handling, recycling, and disposal of municipal solid wastes in the urban and rural sectors. Emphasizes an integrated waste-management system with resource recovery, composting, incineration, landfill disposals, and their costs. May also be offered as BE 4840. *Preq:* EES 2020 or EES 4010.

**EES 4850\* Hazardous Waste Management** 3 (3) Introduction to the problems, regulations, treatment, and ultimate disposal of hazardous and toxic materials. Spill cleanup, groundwater transport, land disposal, incineration, and treatment technologies are discussed. *Preq:* EES 2020 or EES 4010; and CH 2010 or CH 2230.



**EES 4860\* Environmental Sustainability 3 (3)**

Topics include sustainable engineering and industrial ecology with emphasis on pollution prevention methods using source reduction, recycling assessments, treatment to reduce disposal, life-cycle assessment and design for the environment. Emphasizes case studies. *Preq:* Junior standing in College of Engineering and Science.

**EES 4900\* Special Projects 1-3 (1-3)** Studies or laboratory investigations on special topics in the environmental engineering and science field. Arranged on a project basis with a maximum of individual student effort and a minimum of staff guidance. May be repeated for a maximum of three credits. Includes Honors sections. *Preq:* Consent of instructor.

**EES 4910 Selected Topics in Environmental Engineering 1-3 (1-3)** Study of the dynamic role of environmental engineering in maintaining environmental quality. A comprehensive study of any phase of environmental engineering. May be repeated for credit, but only if different topics are covered. *Preq:* Consent of department chair.

**EES 4950 Honors Thesis in Environmental Engineering 1 (1)** Continuation of EES 4000. Students complete their honors thesis in environmental engineering and give an oral presentation of the results. *Preq:* EES 4000 and consent of instructor and membership in the Calhoun Honors College.

## EXECUTIVE LEADERSHIP AND ENTREPRENEURSHIP

*Associate Professors:* P.T. Gianiodis, W.H. Stewart; *Assistant Professors:* A.E. Ingram, J.W. Ridge; *Lecturer:* J.E. Hopkins

**ELE 3010 Introduction to Entrepreneurship 3 (3)** An overview of entrepreneurship topics: opportunity creation and discovery, business concepts and business models, feasibility and business plans. Financial, managerial, legal, social and ethical issues are also addressed. *Preq:* MGT 2010.

**ELE 3140 New Venture Creation I 3 (3)** First in a two-part series that continues with MGT (ELE) 3150 assessing entrepreneurial opportunities. Focuses on creativity, idea generation, market opportunity analysis, strategy, and methods of entry. Opportunity analysis may be developed into a full new venture plan in ELE 3150 or MGT 3150. May also be offered as MKT 3140. *Preq:* Junior standing.

**ELE 3150 New Venture Creation 3 (3)** Through the development of a business plan, the course focuses on creating an organization capable of effectively exploiting a viable opportunity. Topics include organization strategy and design, start-up capital, operations and sourcing issues, leadership, team building, and management of rapid growth. May also be offered as MGT 3150. *Preq:* ELE 3010.

**ELE 3210 Economics of Innovation 3 (3)** Examines the nature of entrepreneurship and the contribution of innovation to economic growth. Investigates the organizational and institutional sources of innovation in different firms and different countries as well as the work of economic theorists concerning the role entrepreneurs play in bringing new products to market. May also be offered as ECON 3210. *Preq:* ECON 3060 or ECON 3140.

**ELE 3560 Social Science of Entrepreneurship 3 (3)**

Examines those areas of the social sciences that have direct relevance for entrepreneurs. Topics include processes by which entrepreneurs are shaped by social institutions such as the family and community, public policy implications and influences on entrepreneurship, risk perception, decision making, motivation, leadership, and group dynamics. May also be offered as POSC 3560 or PSYC 3560 or SOC 3560. *Preq:* SOC 2010 or SOC 2020 or SOC 2350 or PSYC 2010 or POSC 1010 or POSC 1020 or POSC 1040.

**ELE 4000\* Technology Entrepreneurship 3 (3)** Introduction to technology entrepreneurship emphasizing ideation, opportunity assessment, market and technology forecasting, intellectual property protection, financial modeling and business valuation, project management, and cross-functional team building. *Preq:* Junior standing in the College of Engineering and Science.

**ELE 4010 Executive Leadership and Entrepreneurship II 3 (3)** Continuation of ELE 3010 with extensive use of a computer-simulated business start-up. *Preq:* ELE 3010.

**ELE 4190 Agribusiness Innovation and Entrepreneurship 3 (3)** Emphasis on assessing students' abilities as agribusiness entrepreneurs, evaluating the feasibility of a business idea, creating strategies for organizing and marketing the agricultural business, exploring pricing for products or services, developing capital needs and sound financial statements, and researching, developing, and writing a comprehensive plan for the business. *Preq:* AGM 2190 or AGM 3190 or APEC 3020 or APEC 3190 or MGT 2010. May also be offered as AGM 4190.

**ELE 4990 Executive Leadership and Entrepreneurship III 3-6 (3-6)** Continuation of ELE 3010 and 4010. Directed practical study of entrepreneurship and leadership. Students work closely with external infant firms to develop new products and bring existing products to market successfully. *Preq:* ELE 4010.

## ENGINEERING MECHANICS

*Professors:* N.M. Aziz, S.D. Schiff; *Assistant Professors:* N.B. Kaye, W. Pang, F.Y. Testik; *Senior Lecturers:* B.G. Nielson, M.M. Sternhagen

**EM 2020 Engineering Mechanics: Dynamics 3 (3)** Continuation of CE 2010. Principal topics are kinematics and kinetics of particles and rigid bodies of finite size. Techniques of vector mathematics are employed. Includes Honors sections. *Preq:* CE 2010 and MATH 2060.

## ENGLISH

*Professors:* S.M. Ashton, R.E. Barfield, D. Blakesley, W.K. Chapman, S.J. Hilligoss, T.W. Howard, M.J. Jacobi, S.B. Katz, G.W. Koon, L.J. Morrissey, C.E. Paul, R.B. Palmer, V.J. Vitanza, S.D. Williams, *Chair:* A.P. Young; *Associate Professors:* J.B. Field, C.A. Hayes, J.R. Holmevik, K.S. Manganeli, K.L. Morris, E.J. Rivlin, E.K. Sparks, W. Stockton; *Assistant Professors:* C.F. Bushnell, D.S. Coombs, E.M. Goss, G. Hankins, W. Hunter, D. Mastroianni, M.L. LeMahieu, B.M. McGrath, A.M. Naimou, R.R. Thomas, A. Skrodzka-Bates, J.M. Weiss; *Visiting Professor:* S. Eisinger; *Visiting Assistant Professors:* S.J. Lauro, J. Morgenstern, M. Schilleman; *Senior Lecturers:* A.S. Crowden, A.N. Monaghan, B.J. Ramirez; *Lecturers:* S.T. Allred, C.A. Benson, S. Cooper, D.C. Foltz, D.P. Galvin, E. Gardiner, C.C. Holmes, A.B. Katz, K. Kettnich, A.P. Kudera, M. McCarroll, A. Oberdan, K.B. Proehl, M.N. MacAlystre, W.M. Pulley, J.L. Pursley III, P.D. Randall, L. Salley, M.F. Shirley, E.A. Stansell, W.A. Stanton, N.V. Swanson, A.N. Swords, R. Wilhelm

**ENGL 1010 Composition I 3 (3)** Training in correct and effective expression in brief expository essays; review of the fundamentals of grammar and punctuation; instruction in common expository methods.

**ENGL 1020 Composition II 3 (3)** Continued emphasis on correct and effective expression; training in the organization and writing of the research report. *Preq:* ENGL 1010.

**ENGL 1030 Accelerated Composition 3 (3)** Training in composing correct and effective expository and argumentative essays, including writing documented essays. Students who have received credit for ENGL 1020 will not be allowed to enroll in or receive credit for ENGL 1030. Includes Honors sections. *Coreq:* ENGL 1031.

**ENGL 1031 Accelerated Composition Laboratory 0 (1)** Non-credit laboratory to accompany ENGL 1030. *Coreq:* ENGL 1030.

**ENGL 1110 English as a Second Language 3 (3)** Special course for students learning English as a second language. Intensive study and drill in American English pronunciation and listening comprehension. Required of all foreign students who do not make a satisfactory grade on screening examination in oral English. To be taken Pass/No Pass only. Carries no credit for graduation. *Coreq:* ENGL 1111.

**ENGL 1111 English as a Second Language Laboratory 0 (2)** Non-credit laboratory to accompany ENGL 1110. *Coreq:* ENGL 1110.

**ENGL 2020 The Major Forms of Literature 3 (3)** Study of the basic structures and elements of fiction, poetry, and drama, including literary and critical theory, with readings in American, British, and world literature. Proficiency in composition must be demonstrated. Includes Honors sections. *Preq:* ENGL 1030.

**ENGL 2120 World Literature 3 (3)** Introduction to selected works from the Americas Africa, Asia, Europe, and the Middle East from ancient to modern eras, with emphasis on major authors. Includes Honors sections. *Preq:* ENGL 1030.

- ENGL 2130 British Literature 3 (3)** Introduction to selected authors and major periods of the British literary tradition, from the Middle Ages to World War II, with attention to poetry, fiction, and drama. Includes Honors sections. *Preq:* ENGL 1030.
- ENGL 2140 American Literature 3 (3)** Introduction to selected authors and major periods of the American literary tradition from 1620 to 1945. Includes Honors sections. *Preq:* ENGL 1030.
- ENGL 2150 Literature in 20th- and 21st-Century Contexts 3 (3)** Introduction to major contemporary cultural movements via selected authors in 20th- and 21st-century literature, primarily American and British, with attention to poetry, fiction, and drama since World War II. Includes Honors sections. *Preq:* ENGL 1030.
- ENGL 2310 Introduction to Journalism 3 (3)** Instruction and practice in writing for mass media; editorial responsibilities. *Preq:* ENGL 1030.
- ENGL 3000 Professional Development 2 (2)** Orientation to the English major as a discipline and as a preparation for a range of careers. Introduction to and assistance with the compilation of the digital portfolio as a place to collect, synthesize and reflect on learning.
- ENGL 3010 Great Books of the Western World 3 (3)** Introduces Great Works minor. Includes readings about the Great Books concept, as well as various great books from the humanities, arts and natural and social sciences. Includes Honors sections. May also be offered as GW 3010. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3040 Business Writing 3 (3)** Introduction to audience, context, purpose, and writing strategies for texts common in professional business settings: memoranda, letters, reports, and proposals. Includes individual and team projects. *Preq:* Junior standing.
- ENGL 3100 Critical Writing About Literature 3 (3)** Terms and techniques for literary analysis, including close reading, vocabulary for analysis, research and writing skills, casebook study of critical approaches. Discussion of poetry and genres preferred. *Preq or concurrent enrollment:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3120 Advanced Composition 3 (3)** Workshop in practical writing focusing on principles and style. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3140 Technical Writing 3 (3)** Intensive, project-based application of principles of audience, context, purpose, and writing strategies of technical writing: proposals, reports, communication deliverables. Individual and team projects. Includes Honors sections. *Preq:* Junior standing.
- ENGL 3150 Scientific Writing and Communication 3 (3)** Study and practice of rhetorical conventions in professional scientific communication through the analysis and writing of major genres. Focuses on principles, strategies, and styles of scientific argumentation and audience adaptation in written, oral, and visual media. Intended for students majoring in the sciences. *Preq:* ENGL 1030; and BIOL 1030 or [BIOL 1100 and BIOL 1110]; and Junior standing.
- ENGL 3320 Visual Communication 3 (3)** Hands-on survey of visual communication theories and practices used by technical communicators in business and industry environments. Class meets regularly in computer classrooms. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3330 Writing for the News Media 3 (3)** Practical experience in gathering and writing news and feature copy for the media, preparing for an array of writing styles as demanded by the broad spectrum of print and media outlets. Examination of the modern media specialist, laws governing the profession, and journalistic ethics. *Preq:* ENGL 2310.
- ENGL 3450 The Structure of Fiction 3 (3)** Introduction to the creative writing and critical study of prose fiction.
- ENGL 3460 The Structure of Poetry 3 (3)** Introduction to the creative writing and critical study of poetry.
- ENGL 3470 The Structure of Drama 3 (3)** Introduction to the creative writing and critical study of drama.
- ENGL 3480 The Structure of the Screenplay 3 (3)** Introduction to the creative writing and critical study of the screenplay. Screenplays vary from semester to semester. May be repeated once for credit with consent of instructor.
- ENGL 3490 Technology and the Popular Imagination 3 (3)** Examines relationship between technology and fiction and creative nonfictional texts, including print, film, and electronic media. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3500 Mythology 3 (3)** Study of the great myths of the world emphasizing their applications to literature. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3530 Ethnic American Literature 3 (3)** Critical examination of essays, poetry, fiction, and drama written by members of a variety of American racial and ethnic groups, such as Native Americans, African Americans, Chicano/Mexican Americans, Asian Americans, Italian Americans, and American Jews. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3550 Global Studies in Popular Culture 3 (3)** Examination of the nature, functions, history, and effect of global culture upon societies throughout our digitally connected world of various media, such as best sellers, popular magazines, television, movies, Internet, gaming platforms, and emerging electronic genres. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3560 Science Fiction 3 (3)** Readings in science fiction from the 17th century to the present, with special emphasis on writers since Verne and Wells. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3570 Film 3 (2)** Examination of the film medium as an art form: its history, how films are made, why certain types of films (western, horror movies, etc.) have become popular, and how critical theories provide standards for judging film. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150. *Coreq:* ENGL 3571.
- ENGL 3571 Film Laboratory 0 (3)** Non-credit laboratory to accompany ENGL 3570. *Coreq:* ENGL 3570.
- ENGL 3670 Special Topics for Honors Students 3 (3)** Varied topics of general interest in literature, language, rhetoric, or culture for all honors students. Specific topics announced each semester. May be repeated for a maximum of nine credits. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3800 British and American Women Writers 3 (3)** Poetry, drama, fiction, and prose by established and little-known women writers in Britain and America. Particular attention to works treating themes and issues concerning women's lives. Readings on such topics as women and work, education, religion, creativity. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3850 Children's Literature 3 (3)** Reading and analysis in a wide range of authors, illustrators, and genres appropriate for children from preschool through eighth grade, classic as well as modern. Critical approaches include historical, thematic, and social. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3860 Adolescent Literature 3 (3)** Reading and analysis of literature written for readers age 12–18. Emphasis is on historical context, chief themes and motifs, and censorship issues, as well as connections with classic literature. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3960 British Literature Survey I 3 (3)** Examines key texts in British literature to 1789. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3970 British Literature Survey II 3 (3)** Examines key texts of British literature from 1789 to the present. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3980 American Literature Survey I 3 (3)** Examines key texts of American literature from beginnings of European settlement to the Civil War in historical context. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 3990 American Literature Survey II 3 (3)** Examines key texts of American literature from the Civil War to the present in historical context. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 4000\* The English Language 3 (3)** Studies in English usage and historical development of the language. *Preq:* ENGL 3100.
- ENGL 4010\* Grammar Survey 3 (3)** Survey of modern grammars with a focus on exploring the impact structural grammar has had on traditional grammar. Recommended for English teachers. *Preq:* ENGL 3100.
- ENGL 4030 The Classics in Translation 3 (3)** Examination of Homer's Iliad and Odyssey, Virgil's Aeneid, and Ovid's Metamorphoses. A few shorter works by other Greek and Roman writers may also be read. *Preq:* ENGL 3100.
- ENGL 4070\* The Medieval Period 3 (3)** Selected works of Old and Middle English literature, exclusive of Chaucer. *Preq:* ENGL 3100.

- ENGL 4080\* Chaucer 3 (3)** Selected readings in Middle English from *The Canterbury Tales* and other works by Chaucer. *Preq:* ENGL 3100.
- ENGL 4100\* Drama of English Renaissance 3 (3)** Selected readings in non-Shakespearean dramatic literature of the 16th and 17th centuries. *Preq:* ENGL 3100.
- ENGL 4110\* Shakespeare 3 (3)** Study of selected tragedies, comedies, and history plays of Shakespeare. Required of all English majors. *Preq or concurrent enrollment:* ENGL 3100
- ENGL 4140\* Milton 3 (3)** Development of Milton's art and thought from the minor poems and selected prose through *Paradise Lost*, *Paradise Regained*, and *Samson Agonistes*, set against the background of the late Renaissance. *Preq:* ENGL 3100.
- ENGL 4150\* The Restoration and Eighteenth Century 3 (3)** Readings in Dryden, Swift, Pope, and Dr. Johnson. *Preq:* ENGL 3100.
- ENGL 4160\* The Romantic Period 3 (3)** Readings from the poetry and critical prose of Blake, Wordsworth, Coleridge, Byron, Shelley, Keats, and other representative figures. *Preq:* ENGL 3100.
- ENGL 4170\* The Victorian Period 3 (3)** Reading from the poetry and nonfiction prose of selected Victorian authors, including works of Carlyle, Tennyson, Browning, Arnold, and other representative figures. *Preq:* ENGL 3100.
- ENGL 4180\* The English Novel 3 (3)** Study of the English novel from its 18th century beginnings through the Victorian Period. *Preq:* ENGL 3100.
- ENGL 4190\* Postcolonial and World Literatures 3 (3)** Selected readings in post-colonial literature and theory, focusing on issues of nationalism, migration, resistance, race, language, and master narratives. *Preq:* ENGL 3100.
- ENGL 4200\* American Literature to 1799 3 (3)** Focused study of authors, movements, themes, critical approaches, and genres in literature of colonial and early national America from early European explorations of the continent to 1799. *Preq:* ENGL 3100.
- ENGL 4210\* American Literature from 1800 to 1899 3 (3)** Focused study of authors, movements, themes, critical approaches, and genres in the poetry and prose of major American authors and literary movements from the nineteenth century. *Preq:* ENGL 3100.
- ENGL 4250\* The American Novel 3 (3)** Survey of the most significant forms and themes of the American novel from its beginnings to 1900. *Preq:* ENGL 3100.
- ENGL 4260\* Southern Literature 3 (3)** Intellectual and literary achievement of the South from 1607 to the present, with emphasis on the writers of the 19th century. *Preq:* ENGL 3100.
- ENGL 4280\* Contemporary Literature 3 (3)** Focuses on American, British, and other fiction, poetry, and drama from Post-World War II to the present. *Preq:* ENGL 3100.
- ENGL 4290\* Dramatic Literature I 3 (3)** Selected reading in the dramatic literature from the classical era of Greece and Rome to the Renaissance. May also be offered as THEA 4290. *Preq:* ENGL 3100.
- ENGL 4300\* Dramatic Literature II 3 (3)** Principles and progress of drama from the Restoration to the present; analysis of representative plays; critical reports; discussion of trends in dramatic literature. May also be offered as THEA 4300. *Preq:* ENGL 3100.
- ENGL 4310\* Modern Poetry 3 (3)** The modern tradition in English and American poetry from Yeats to the present; relevant critical essays. *Preq:* ENGL 3100.
- ENGL 4320\* Modern Fiction 3 (3)** American and British novels and short stories of the 20th century. *Preq:* ENGL 3100.
- ENGL 4330\* The Anglo-Irish Literary Tradition 3 (3)** Exploration of the unique literary heritage and achievement of English-language Irish writers in the 19th and 20th centuries. Major figures of the Irish tradition: W. B. Yeats, James Joyce, Samuel Beckett, and other writers; consideration of the specifically Irish aspects of their works. *Preq:* ENGL 3100.
- ENGL 4340\* Environmental Literature 3 (3)** Survey of literature that examines the relationship between human beings and the natural world, including analysis of environmental themes in myths and legends and in selected poetry and prose of 19th and 20th-century England and America. *Preq:* ENGL 3100.
- ENGL 4350\* Literary Criticism 3 (3)** Major critical approaches to literature. *Preq:* ENGL 3100.
- ENGL 4360\* Feminist Literary Criticism 3 (3)** Introduces the germinal works of feminist literary theory and criticism. Outlines the development of modern literary criticism by studying feminist versions of the major critical methodologies. May also be offered as WS 4360. *Preq:* ENGL 3100.
- ENGL 4370\* Directed Studies 1-3 (1-3)** Class and tutorial work for students with special interests or projects in American, British, or European literature outside the scope of existing courses. Applications must be approved during the registration period of the semester preceding the one in which directed studies will occur. May be repeated by arrangement with the department. *Preq:* ENGL 3100.
- ENGL 4380 Departmental Honors Research 3 (3)** Research for the preparation of an honors project. *Preq:* ENGL 3100.
- ENGL 4390 Departmental Honors Project 3 (3)** Preparation of an honors project. *Preq:* ENGL 3100.
- ENGL 4400\* Literary Theory 3 (3)** Examination of how approaches such as Marxism, Psychoanalysis, Feminism, Deconstruction, New Historicism, Post-Colonialism, Cultural Studies, and Queer Theory answer the question, "What is literature?" *Preq:* ENGL 3100.
- ENGL 4410\* Literary Editing 3 (3)** Examination of how the theories and practices of editing construct texts, stressing the problems and objectives of editing and providing practical experience with literary editing. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 4420\* Cultural Studies 3 (3)** Investigation of the similarities and connections between a wide variety of cultural products, events, and practices - from fast food to opera to online shopping - using theories ranging from Marxism to hybridity. *Preq:* ENGL 3100.
- ENGL 4430 Theories of World Literature 3 (3)** Examination of the historical and contemporary theories of world literature, including theories of worldliness, planetarity, globalism, and late capitalism. These theories are used in pursuit of world literature on a worldwide and planetary scale. *Preq:* ENGL 3100.
- ENGL 4440\* Renaissance Literature 3 (3)** Selected readings in non-Shakespearean British literature from 1500-1660. Includes drama, poetry, and prose. *Preq:* ENGL 3100.
- ENGL 4450\* Fiction Workshop 3 (3)** Workshop in the creative writing of prose fiction. May be repeated once for credit. *Preq:* ENGL 3450.
- ENGL 4460\* Poetry Workshop 3 (3)** Workshop in the creative writing of poetry. May be repeated once for credit. *Preq:* ENGL 3460.
- ENGL 4470\* Playwriting Workshop 3 (3)** Workshop in the creative writing of plays. May be repeated once. May also be offered as THEA 4470. *Preq:* ENGL 3470 or THEA 3470.
- ENGL 4480\* Screenwriting Workshop 3 (3)** Workshop in the creative writing of screenplays. May be repeated once for credit. *Preq:* ENGL 3480.
- ENGL 4490\* Creative Non-Fiction 3 (3)** Advanced workshop in writing non-fiction prose for magazine and free-lance markets. *Preq:* ENGL 3450 or ENGL 3460.
- ENGL 4500\* Film Genres 3 (2)** Advanced study of films that have similar subjects, themes, and techniques, including such genres as the Western, horror, gangster, science fiction, musical, and/or screwball comedy. Also considers nontraditional genres, screen irony, genre theory, and historical evolution of genres. Topics vary. *Preq:* ENGL 3570. *Coreq:* ENGL 4501.
- ENGL 4501\* Film Genres Laboratory 0 (3)** Non-credit laboratory to accompany ENGL 4500. *Coreq:* ENGL 4500.
- ENGL 4510\* Film Theory and Criticism 3 (2)** Advanced study into the theory of film/video making emphasizing understanding a variety of critical methods to approach a film. Examines the history of film theory and defines the many schools of film criticism, including realism, formalism, feminism, semiotics, Marxism, and expressionism. May also be offered as COMM 4510. *Preq:* ENGL 3570. *Coreq:* ENGL 4511.
- ENGL 4511\* Film Theory and Criticism Laboratory 0 (3)** Non-credit laboratory to accompany ENGL 4510. May also be offered as COMM 4511. *Coreq:* ENGL 4510.
- ENGL 4520\* Great Directors 3 (2)** Intensive study of one to three film directors emphasizing understanding the entire canon of each director. Students study similarities in techniques, shifts in thematic emphasis, and critical methodologies for approaching the works of each director. Topics vary. *Preq:* ENGL 3570. *Coreq:* ENGL 4521.
- ENGL 4521\* Great Directors Laboratory 0 (3)** Non-credit laboratory to accompany ENGL 4520. *Coreq:* ENGL 4520.

- ENGL 4530\* Sexuality and the Cinema** 3 (2) Examination of male/female sexual roles and their evolution in American genre films, avant-garde cinema, and international films. Includes the study of movies in relation to cultural values and social stereotypes, introduction to feminist film theory, and consideration of film pornography. *Preq:* ENGL 3570. *Coreq:* ENGL 4531.
- ENGL 4531\* Sexuality and the Cinema Laboratory** 0 (3) Non-credit laboratory to accompany ENGL 4530. *Coreq:* ENGL 4530.
- ENGL 4540 Selected Topics in International Film** 3 (2) Presents subtitled films of specific world cultures and basic film theory and discourse applicable to the selected areas. Taught in English. May be repeated for a maximum of six credits with consent of department chair. May also be offered as LANG 4540. *Preq:* ENGL 3100. *Coreq:* ENGL 4541.
- ENGL 4541 Selected Topics in International Film Laboratory** 0 (3) Non-credit laboratory to accompany ENGL 4540. May also be offered as LANG 4541. *Coreq:* ENGL 4540.
- ENGL 4550\* American Humor** 3 (3) Native American humor of the 19th and 20th centuries. *Preq:* ENGL 3100.
- ENGL 4560\* Literature and Arts of the Holocaust** 3 (3) Addresses the Holocaust through literature, art, architecture, music, and film. Beginning with historical, political, and economic forces that contributed to the Holocaust, course then focuses on highly diverse creative responses to this event – responses that often reflect the difficulties and politics of these commemorative gestures. May also be offered as HUM 4560. *Preq:* ENGL 3100.
- ENGL 4590\* Special Topics in Language, Criticism, Theory** 3 (3) Advanced studies in topics not central to other English courses, such as certain authors, works, genres, themes, or areas of knowledge and culture. Specific topics are announced when offered. May be repeated once for credit with department chair's consent. *Preq:* ENGL 3100.
- ENGL 4600\* Issues in Writing Technologies** 3 (3) Examination of writing technologies from different historical periods. Investigates how writing is understood, circulated, legislated, and protected in terms of its production technology. *Preq:* ENGL 3100; and ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.
- ENGL 4630\* Topics in Literature to 1699** 3 (3) Selected readings in literature from antiquity through the 17th century for focused study of authors, movements, themes, critical approaches, and genres. Topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 3100.
- ENGL 4640\* Topics in Literature from 1700 to 1899** 3 (3) Selected readings in 18th- and 19th-century literature for focused study of authors, movements, themes, critical approaches, and genres. Special topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 3100.
- ENGL 4650\* Topics in Literature from 1900** 3 (3) Selected readings in 20th- and 21st-century literature for focused study of authors, movements, themes, critical approaches, and genres. Topics vary and are constructed by individual faculty. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 3100.
- ENGL 4750\* Writing for Electronic Media** 3 (3) Workshop in new forms of writing and hypertextual design for interactive electronic media, including social networks, online and video communities. May be repeated once for credit at the undergraduate level. *Preq:* ENGL 3100.
- ENGL 4780\* Digital Literacy** 3 (3) Examines how technology has expanded ideas of literacies and texts. Includes reading, studying and analyzing print and digital texts to determine how digital techniques change patterns of reading and how readers make sense of electronic texts. *Preq:* ENGL 3100.
- ENGL 4820\* African American Literature to 1920** 3 (3) Critical examination of the development of the African American literary tradition from the Colonial Period to the Harlem Renaissance. Considers the historical and cultural contexts of a variety of texts, themes and theories. *Preq:* ENGL 3100.
- ENGL 4830\* African American Literature from 1920 to the Present** 3 (3) Critical examination of the development of the African American literary tradition from the Harlem Renaissance to the present. Considers historical and cultural contexts of a variety of texts, themes, theories and literary movements. *Preq:* ENGL 3100.
- ENGL 4850\* Composition and Language Studies for Teachers** 3 (3) Examines the principles and practices of composing and teaching composition. Includes a historical study of English language with attention to phonology, morphology, syntax, semantics, and practical aspects of language grammars. Serves as a practicum in composing and assessing processes, collaborative learning, writers purposes, audience expectations, and language conventions. May also be offered as EDSC 4850. *Preq:* ENGL 3100.
- ENGL 4870\* Topics in Book History** 3 (3) Examines the material and theoretical constructions of the book. Covers both historical and contemporary dimensions of dissemination, reception, artistry, and influence of books. *Preq:* ENGL 1030.
- ENGL 4880\* Genre and Activity Theory** 3 (3) Examination of the forms that texts take, of the print and digital media in which they are composed, and of the ways they circulate among experts, in the public, and around the world. *Preq:* Junior standing.
- ENGL 4890\* Special Topics in Writing and Publication Studies** 3 (3) Selected readings from topics in writing and publication studies, emphasizing areas such as major theories, practices, research, and critical approaches. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* ENGL 3100.
- ENGL 4900\* Advanced Technical and Business Writing** 3 (3) Advanced work in writing proposals, manuals, reports and publishable articles. Client-based and collaborative writing. *Preq:* ENGL 3040 or ENGL 3140.
- ENGL 4910\* Classical Rhetoric** 3 (3) Traces the development of rhetoric from Protagoras through Isocrates, Plato, Aristotle, Cicero and Quintillian and considers questions essential to understanding persuasive theory and practices. May also be offered as COMM 4910. *Preq:* ENGL 3100.
- ENGL 4920\* Modern Rhetoric** 3 (3) Examines the new rhetorics of the 20th century, which are grounded in classical rhetoric but include findings from biology, psychology, linguistics and anthropology, among other disciplines. May also be offered as COMM 4920. *Preq:* ENGL 3100.
- ENGL 4940\* Writing About Science** 3 (3) Advanced work in scientific writing and editing for peer and lay audiences. *Preq:* ENGL 3100.
- ENGL 4950\* Technical Editing** 3 (3) Practical experience in editing and preparing technical manuscripts for publication. General introduction to the functions of the technical editor. *Preq:* ENGL 3140.
- ENGL 4960 Senior Seminar** 3 (3) Capstone course requiring participation and a substantial essay, allowing graduating English majors the chance to work closely with faculty and other English majors on a special topic in the advanced study of literature, rhetoric, writing, and/or publication studies. *Preq:* ENGL 3100 and Senior standing in English.
- ENGL 4980\* Writing Center Theory and Practice** 3 (3) Preparation for students to work in the Clemson University Writing Center. Required of all undergraduate Writing Fellows. *Preq:* Sophomore standing and consent of instructor. *Coreq:* ENGL 4981.
- ENGL 4981\* Writing Center Theory and Practice Laboratory** 0 (1) Non-credit laboratory to accompany ENGL 4980. *Coreq:* ENGL 4980.
- ENGL 4990 Practicum in Writing** 3 (3) Students apply their knowledge of concepts and principles to a substantive project involving their internship experiences and/or writing and publishing interests. To be taken Pass/No Pass only. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150; and Junior standing.

## ENGINEERING

*Associate Professor:* W.J. Park; *Senior Lecturers:* S.C. Brandon, J.C. Minor, E.A. Stephan, N. Yasmin; *Lecturers:* D.J. Ewing, S.J. Grigg, A.D. Kapadia, S.H. Lau, J.R. Maier, W.D. Martin

- ENGR 1020 Engineering Disciplines and Skills** 2 (1) Provides solid foundation of skills to solve engineering problems. Students demonstrate problem solving techniques with spreadsheets, dimensions and units; use modeling techniques and interpret validity of experimental results. Students design projects on multi-discipline teams. Introduces professional and societal issues appropriate to engineering. Various forms of technical communication are emphasized. Includes Honors sections. *Preq* or *concurrent enrollment:* MATH 1040 or MATH 1060. *Coreq:* ENGR 1021.
- ENGR 1021 Engineering Disciplines and Skills Laboratory** 0 (2) Non-credit laboratory to accompany ENGR 1020. *Coreq:* ENGR 1020.

**ENGR 1050 Engineering Discipline and Skills I** 1 (2) Provides solid foundation of skills to solve engineering problems. Students demonstrate problem solving techniques with spreadsheets, dimensions and units. Introduces professional and societal issues appropriate to engineering. *Preq or concurrent enrollment:* MATH 1040 or MATH 1060.

**ENGR 1060 Engineering Discipline and Skills II** 1 (2) Continuation of topics introduced in ENGR 1050. Students demonstrate problem solving techniques using spreadsheet and modeling techniques, and by interpreting validity of experimental results. Students complete projects on multi-discipline teams. Various forms of technical communication are emphasized. *Preq:* ENGR 1050 with a C or better. *Preq or concurrent enrollment:* MATH 1040 or MATH 1060.

**ENGR 1070 Programming and Problem Solving I** 1 (2) Students formulate and solve engineering problems using MATLAB: estimate answers for comparison to computed solutions; read, interpret and write programs, instructions and output (both written and graphical); and debug. Includes Honors sections. *Preq or concurrent enrollment:* ENGR 1060 and one of MATH 1060 or MATH 1070 (Honors students must enroll in MATH 1080).

**ENGR 1080 Programming and Problem Solving II** 1 (2) Continuation of topics introduced in ENGR 1070. Students formulate and solve engineering problems using MATLAB; read, interpret and write programs; utilize trendlines; iterate/loops; evaluate and compose conditional statements; and debug. Includes Honors sections. *Preq:* ENGR 1070, with a C or better. *Preq or concurrent enrollment:* MATH 1060 or MATH 1070 (Honors students must enroll in MATH 1080).

**ENGR 1090 Programming and Problem Solving Applications** 1 (2) Students formulate and solve engineering problems on multi-discipline teams using MATLAB. Various forms of technical communication are emphasized. Includes Honors sections. *Preq or concurrent enrollment:* ENGR 1080 with a C or better; and one of MATH 1060 or MATH 1070 (Honors students must enroll in MATH 1080).

**ENGR 1200 Engineering Problem Solving and Design** 3 (1) Methodology and practice of engineering problem solving and engineering design. Selected computer tools, teamwork, and communication modes are employed. Ethics, safety, economics, and environmental concerns are considered. Includes Honors sections. *Preq:* MATH 1060. *Preq or concurrent enrollment:* PHYS 1220. *Coreq:* ENGR 1201.

**ENGR 1201 Engineering Problem Solving and Design Laboratory** 0 (4) Non-credit laboratory to accompany ENGR 1200. *Coreq:* ENGR 1200.

**ENGR 1300 Engineering Fundamentals** 2 (1) Students formulate and solve engineering problems using advanced spreadsheet applications, dimensional analysis, graphical representation of various physical phenomena, mathematical models and statistics. Various forms of technical communication are emphasized. Credit toward a degree will be given for only one of ENGR 1300 or 1410. *Preq:* ENGR 1060. *Preq or concurrent enrollment:* MATH 1060 or MATH 1070. *Coreq:* ENGR 1301.

**ENGR 1301 Engineering Fundamentals Laboratory** 0 (2) Non-credit laboratory to accompany ENGR 1300. *Coreq:* ENGR 1300.

**ENGR 1410 Programming and Problem Solving** 3 (2) Students formulate and solve engineering problems using MATLAB; estimate answers for comparison to computed solutions; read, interpret and write programs, instructions and output; iterate, evaluate conditional statements; and debug. Various forms of technical communication are emphasized. Credit toward a degree will be given for only one of ENGR 1300 or ENGR 1410. Includes Honors sections. *Preq:* ENGR 1020 with a C or better. *Preq or concurrent enrollment:* MATH 1060 or MATH 1070. *Coreq:* ENGR 1411. Additional prerequisites for honors students: Membership in Calhoun Honors College and MATH 1080 or concurrent enrollment.

**ENGR 1411 Programming and Problem Solving Laboratory** 0 (2) Non-credit laboratory to accompany ENGR 1410. *Coreq:* ENGR 1410.

**ENGR 1900 Special Projects in Engineering I** 1-3 (1-3) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.

**ENGR 2080 Engineering Graphics and Machine Design** 2 (1) Introduction to engineering graphics and machine design. Sketching and CAD tools are used to visualize, communicate, rapid prototype and analyze engineering problems. Credit toward a degree will be given only for ENGR 2080, 2090, or 2100. Includes Honors sections. *Coreq:* ENGR 2081.

**ENGR 2081 Engineering Graphics and Machine Design Laboratory** 0 (2) Non-credit laboratory to accompany ENGR 2080. *Coreq:* ENGR 2080.

**ENGR 2090 Introduction to Engineering/Computer Graphics** 2 (1) Introduction to engineering graphics principles. Sketching and CAD tools are used to visualize, communicate, and perform graphical analysis of engineering problems. Credit toward a degree will be given for only one of ENGR 2080, 2090, or 2100. *Coreq:* ENGR 2091.

**ENGR 2091 Introduction to Engineering/Computer Graphics Laboratory** 0 (3) Non-credit laboratory to accompany ENGR 2090. *Coreq:* ENGR 2090.

**ENGR 2100 Computer-Aided Design and Engineering Applications** 2 (1) Introduction to graphics applications for engineering and related professions. 2-D and 3-D drawings are used to visualize, communicate, rapid prototype and analyze engineering problems. Engineering applications include site plans, contour plots, grading, and architectural, transportation and hydrology drawings. Credit toward a degree will be given for only one of ENGR 2080, 2090, or 2100. Includes honors sections. *Coreq:* ENGR 2101.

**ENGR 2101 Computer-Aided Design and Engineering Applications Laboratory** 0 (2) Non-credit laboratory to accompany ENGR 2100. *Coreq:* ENGR 2100.

**ENGR 2900 Special Projects in Engineering II** 1-3 (1-3) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Sophomore standing and consent of instructor.

**ENGR 3900 Special Projects in Engineering III** 1-3 (1-3) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Junior standing and consent of instructor.

**ENGR 4900 Special Projects in Engineering IV** 1-3 (1-3) Individual or group projects in engineering. Projects may be interdisciplinary in nature and may involve analysis, design, and/or implementation. Instruction in use of necessary tools and test equipment is included when appropriate. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Senior standing and consent of instructor.

## ENVIRONMENTAL AND NATURAL RESOURCES

*Professors:* M. Espey, J.D. Lanham, P.A. Layton, T. Straka; *Associate Professors:* R.F. Baldwin, L. Gering, A. Johnson, C.J. Post, S.R. Templeton; *Assistant Professor:* K. Barrett; *Lecturer:* J. Davis

**ENR 1010 Introduction to Environmental and Natural Resources I** 1 (1) Informative overview of environmental and natural resources and their impact on society. Education and career opportunities are emphasized.

**ENR 3020 Natural Resources Measurements** 3 (2) Introduction to measurements of natural resources including land, vegetation, animal habitat, water quality and quantity, climate, and recreation. Remote sensing techniques are also introduced. May not be taken for credit by Forest Resource Management majors. *Preq or concurrent enrollment:* STAT 2300. *Coreq:* ENR 3021.

**ENR 3021 Natural Resources Measurements Laboratory** 0 (3) Non-credit laboratory to accompany ENR 3020. *Coreq:* ENR 3020.

**ENR 3120 Environmental Risks and Society** 3 (3) Examines the perception, analysis and management of natural and technological risks in modern society, such as how society responds to natural or human-caused disasters and global environmental challenges; and the roles of experts, the government and the general public. Case studies foster debate and critical analysis of controversial issues. *Preq:* Junior standing. Students must have completed the General Education mathematics requirement.

**ENR 4130\* Restoration Ecology** 3 (3) Applies ecological principles to the restoration of disturbed terrestrial, wetland, and aquatic ecosystems. Includes the restoration of soils and waterways, of flora and fauna, and of natural ecological processes such as plant succession and nutrient cycling. May also be offered as BIOL 4130. *Preq:* BIOL 3130 or BIOL 4410 or WFB 3130.

**ENR 4160\* Forest Policy and Administration** 3 (3) Introduction to the development, principles, and legal provisions of forest policy in the United States and an examination of administrative and executive management in forestry. May also be offered as FOR 4160.

**ENR 4290\* Environmental Law and Policy** 3 (3) Develops an understanding of the three branches of government that affect and dictate use and protection of natural resources. Attention is given to major federal environmental statutes. Includes examination of how policy is developed, implemented, and evaluated in the public and private sectors. *Preq:* Junior standing.

**ENR 4340\* Geographic Information Systems for Landscape Planning** 3 (2) Develops competence in geographic information systems (GIS) technology and its application to various spatial analysis problems in landscape planning. Topics include data development and management, spatial analysis techniques, critical review of GIS applications, needs analysis and institutional context. GIS hardware and software, hands-on application. Credit may be received for only one of ENR 434 or FOR 4340. May also be offered as FOR 4340. *Coreq:* ENR 4341.

**ENR 4341\* Geographic Information Systems for Landscape Planning Laboratory** 0 (3) Non-credit laboratory to accompany ENR 4340. May also be offered as FOR 4341. *Coreq:* ENR 4340.

**ENR 4500\* Conservation Issues** 3 (3) Interactive study and discussion of issues related to the conservation of natural resources, emphasizing current issues in the conservation of biodiversity, identification of conflicting issues between consumptive and nonconsumptive resource management, and development of viable solutions for conservation of natural resources. *Preq:* BIOL 3130 or WFB 3130.

## ENVIRONMENTAL SCIENCE AND POLICY

*Associate Professor:* E.R. Carraway; *Lecturers:* S. Brame, M. Nammouz, M.L. Thompson

**ENSP 1250 Sustainable Resource Use** 3 (3) This course explores the challenges our society faces in making the transition to renewable resource use in a way that is truly sustainable environmentally, economically and socially. The conflicting demands of each system will be examined and used to critically examine possible solutions using a systems based approach. May also be offered as GEOL 1250.

**ENSP 2000 Introduction to Environmental Science** 3 (3) Basic principles of environmental science, including ecology, energy, resources, waste management; and air, water, and soil pollution. Consideration of issues, specific cases, investigative approaches, and remedial actions. *Preq or concurrent enrollment:* Any course that satisfies the Natural Science with a Lab General Education requirement. See the *Undergraduate Announcements* for current listing of courses.

**ENSP 2010 Introduction to Environmental Science for Education Majors** 3 (3) Introduction to basic principles of environmental science, including physical science of the environment, energy, resources, waste management, and air and water pollution. Emphasizes the practical applications to demonstrations and activities appropriate for the elementary school classroom. Credit toward a degree will be given for only one of ENSP 2000 and ENSP 2010. *Preq:* BIOL 1090 and PHSC 1170 and PHSC 1180. *Preq or concurrent enrollment:* MATH 3160.

**ENSP 3150 Environment and Agriculture** 3 (3) Survey of the interrelationships of the environment and current agriculture and agricultural practices to include both the environmental impacts of agriculture and the role of agriculture in conservation and improving the environment. Includes Honors sections. May also be offered as PES 3150. *Preq:* Sophomore standing and one of the following combinations: BIOL 1040 and BIOL 1060; or BIOL 1100 and BIOL 1110; or CH 1010 and CH 1020; or CH 1050 and CH 1060.

**ENSP 4000 Studies in Environmental Science** 3 (3) Study of historical perspectives, attitudes, and government policy within the framework of environmental case studies to illustrate the interaction between human and natural factors as they mutually affect the environment and man's ability to deal with that environment. *Preq:* ENSP 2000 or EES 2020 or APEC 2570.

**ENSP 4720\* Environmental Planning and Control** 2 (2) Application of planning and control to effective environmental quality improvement. Considers water supply and treatment, wastewater treatment and disposal, solid waste disposal, air pollution abatement, and land use and zoning from the standpoint of control. Not intended for graduate students in engineering. *Preq:* Consent of instructor.

## ENTOMOLOGY

*Professors:* P.H. Adler, R.G. Bellinger, E.P. Benson, J.D. Culin, P.A. Zungoli; *Associate Professor:* M.W. Turnbull

**ENT 2000 Six-Legged Science** 3 (3) Introduction to insects, their various relationships with humans, other animals, and plants. The general nature of this course makes it beneficial to all students regardless of specialty. Not open to students who have received credit for ENT 3010 or equivalent.

**ENT 2010 Selected Topics** 1 (1) Discussion course covering topics dealing with insects and related arthropods. Subjects are chosen to reflect issues of current interest as well as those having significance in human history. May be repeated for a maximum of three credits.

**ENT 3000 Environmental Entomology** 3 (3) Exploration of diversity and roles of insects in natural and affected environments, impact of insects and pesticides on environmental quality, and discussion of environmental ethics in entomological science. *Preq:* BIOL 1030 or BIOL 1040.

**ENT 3010 Insect Biology and Diversity** 4 (3) Introduction to the study of insects, with emphasis on their structure, function, ecology, and behavior. Identification of commonly encountered species is highlighted. Relationships between insect and human populations are discussed. Control technologies are introduced, with emphasis on environmentally responsible tactics. Offered fall semester only. *Coreq:* ENT 3011.

**ENT 3011 Insect Biology and Diversity Laboratory** 0 (3) Non-credit laboratory to accompany ENT 3010. *Coreq:* ENT 3010.

**ENT 3080 Apiculture** 3 (2) Detailed study of the honey bee and its economic importance in pollination and honey production. Attention is given to bee behavior, colony management, equipment, honey-plant identification, and honey production and processing. *Preq:* BIOL 1040 and BIOL 1060 and consent of instructor. *Coreq:* ENT 3081.

**ENT 3081 Apiculture Laboratory** 0 (3) Non-credit laboratory to accompany ENT 3080. *Coreq:* ENT 3080.

**ENT 4000\* Insect Morphology** 4 (3) Study of insect structure in relation to function and of the variation of form in insects. Includes Honors sections. May also be offered as BIOL 4000. *Preq:* ENT 3010. *Coreq:* ENT 4001.

**ENT 4001\* Insect Morphology Laboratory** 0 (3) Non-credit laboratory to accompany ENT 4000. May also be offered as BIOL 4001. *Coreq:* ENT 4000.

**ENT 4040\* Urban Entomology** 3 (3) Study of pests common to the urban environment with emphasis on arthropod pest biology, pest importance, and management strategies. Students learn both theoretical and practical aspects of urban pest management. Includes Honors sections. *Preq:* BIOL 1030 and BIOL 1040; or BIOL 1100 and BIOL 1110; or ENT 3010.

**ENT 4060\* Diseases and Insects of Turfgrasses** 2 (2) Host-parasite relationships, symptomatology, diagnosis, economics, and control of infectious diseases of turfgrasses and life histories, diagnosis, and control of important insect pests of turfgrasses. May also be offered as PLPA 4060. *Preq:* ENT 3010 and PLPA 3100.

**ENT 4070\* Applied Agricultural Entomology** 3 (2) Topics include recognition, biology, damage, and control of economically important insects and mites found on major Southeastern field, fruit, nut, and vegetable crops. Principles and practices of crop protection, including pesticide application, economic basis for decision making, and development of scouting programs are introduced. *Preq:* ENT 3010. *Coreq:* ENT 4071.

**ENT 4071\* Applied Agricultural Entomology Laboratory** 0 (3) Non-credit laboratory to accompany ENT 4070. *Coreq:* ENT 4070.

**ENT 4080\* Diseases and Insects of Turfgrasses Laboratory** 1 (3) Laboratory to complement PLPA 4060 or ENT 4060 to learn symptomatology, diagnosis, and control of infectious diseases of turfgrasses and diagnosis of damage caused by important insect pests of turfgrasses. May also be offered as PLPA 4080. *Preq:* PLPA 4060 or ENT 4060.

**ENT 4090\* Urban Entomology Laboratory 1** (3) Identification of household and structural pests common to the urban environment. Students also gain hands-on experience in termite and general pest control. Includes Honors sections. *Preq:* BIOL 1030 and BIOL 1040; or BIOL 1100 and BIOL 1110; or ENT 3010. *Preq or concurrent enrollment:* ENT 4040.

**ENT 4150\* Insect Taxonomy 3** (1) Identification of the principal families of the major orders of adult insects. Laboratory work consists of intensive practice of such identification. Lecture material deals with theoretical discussion of taxonomic features observed in the laboratory. May also be offered as BIOL 4150. *Preq:* BIOL 4000 or ENT 4000. *Coreq:* ENT 4151.

**ENT 4151\* Insect Taxonomy Laboratory 0** (6) Non-credit laboratory to accompany ENT 4150. May also be offered as BIOL 4151. *Coreq:* ENT 4150.

**ENT 4360\* Insect Behavior 3** (2) Fundamentals of insect behavior in an evolutionary and ecological perspective. Laboratory emphasizes generation and testing of hypotheses and observation, description, and quantification of insect behavior. May also be offered as BIOL 4360. *Preq:* ENT 3010. *Coreq:* ENT 4361.

**ENT 4361\* Insect Behavior Laboratory 0** (3) Non-credit laboratory to accompany ENT 4360. May also be offered as BIOL 4361. *Coreq:* ENT 4360.

**ENT 4610 Directed Research in Entomology 1-3** (1-3) Development of a senior thesis based on a research problem in a selected entomological area. Emphasis is on integrating the knowledge gained in the student's program with the results of the research project. May be repeated for a maximum of three credits. *Preq:* Senior standing and consent of instructor.

**ENT 4690\* Aquatic Insects 3** (1) Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. Includes Honors sections. May also be offered as BIOL 4690 or WFB 4890. *Preq:* ENT 3010. *Coreq:* ENT 4691.

**ENT 4691\* Aquatic Insects Laboratory 0** (6) Non-credit laboratory to accompany ENT 4690. May also be offered as BIOL 4691 or WFB 4691. *Coreq:* ENT 4690.

**ENT 4900 Practicum 1-4** (1-4) Supervised entomological learning opportunity providing highly individualized experiences to complement other programs and courses. Must be prearranged at least two months in advance. Students must file written reports midway during enrollment period and at its conclusion and must appear for oral evaluation at the end of the period. *Preq:* Junior standing and consent of instructor.

**ENT 4950\* Insect Biotechnology 3** (3) Considers many unique genetic features exhibited by insects and describes the applications of biotechnology to enhance useful products from insects and to affect the control of destructive insects. May also be offered as GEN 4950. *Preq:* ENT 3010 and GEN 3020.

**ENT 4960 Selected Topics in Creative Inquiry 1-2** (1-2) Disciplinary and multidisciplinary projects with the goal of developing the student's ability to discover, analyze, evaluate, and present data. Students are required to document their activities in their ePortfolios. May be repeated for a maximum of six credits. May also be offered as PES 4960. *Preq:* Consent of instructor.

**ENT 4970 Selected Topics in Creative Inquiry Laboratory 1-2** (1-2) Disciplinary and multidisciplinary research project with the goal of developing the student's ability to conduct research along with analysis, evaluation and presentation of results. Students are required to document their research activities in their ePortfolios. May be repeated for a maximum of six credits. May also be offered as PES 4970. *Preq:* Consent of instructor.

## ENVIRONMENTAL TOXICOLOGY

*Professors:* W.V. Baird, V.S. Gallicchio, A.R. Johnson, S.J. Klaine, C.M. Lee, D.V. Maurice, J.C. Morse, C.D. Rice; *Associate Professors:* E.R. Carraway, J.W. Castle, M.A. Schlautman; *Assistant Professors:* D.G. Bielenberg, J. Brumaghim, P. van den Hurk, Y. Yang

**ETOX 4000\* Wildlife Toxicology 3** (3) Assessment of impacts of toxic substances on reproduction, health, and well-being of wildlife species; acute and chronic effects of agricultural chemicals, pesticides, hazardous waste, industrial waste, and oil releases are discussed. *Preq:* [BCHM 3010 or BCHM 3050; or both CH 2230 and CH 2270] and [BIOL 1040 and BIOL 1060; or BIOL 1110] and WFB 3500.

**ETOX 4210\* Chemical Sources and Fate in Environmental Systems 3** (3) Discusses chemical cycles in the environment on global and microcosm scales. Examines the dependence of fate processes on physical and chemical properties and environmental conditions. Addresses breakdown, movement, and transport of selected toxicants to illustrate the mechanisms that govern chemical fate. Includes Honors sections. *Preq:* CH 2230 and CH 2270 and CH 3130.

**ETOX 4300\* Toxicology 3** (3) Basic principles of toxicology, including quantitation of toxicity, toxicokinetics, biochemical action of poisons, and environmental toxicology, are studied. Acute and chronic effects of various classes of poisons (e.g., pesticides, drugs, metals, and industrial pollutants) are discussed in relation to typical routes of exposure and regulatory testing methods. *Preq:* CH 2230 and CH 2270; and either BIOL 1040 and BIOL 1060; or BIOL 1110.

**ETOX 4370\* Ecotoxicology 3** (3) Study of the effects of stressors on the ecosystem. Explores the integrative relationships that comprise the field of ecotoxicology in a hierarchical format that focuses on the various levels of ecological organization. *Preq:* ETOX 4300.

**ETOX 4460 Soil and Water Quality: Fundamentals 3** (3) Studies those aspects of water quality that are influenced by soil systems. Many water quality concerns arise from land-applied chemicals, natural or manufactured. Basic soil and water chemistry principles including sorption, solution chemistry, and soil chemical transport are studied. *Preq:* PES 4750 and CH 2240.

**ETOX 4470 Soil and Water Quality: Applications 3** (3) Potential for water quality concerns arising from land application of natural or manufactured chemicals is varied. Case studies of potential water quality concerns related to fertilizers, pesticides, biosolids, manures, and other sources are presented. Practices that can improve water quality are also studied and evaluated. *Preq:* CH 2240 and PES 4750.

**ETOX 4850\* Environmental Soil Chemistry 3** (3) Study of soil chemical processes (sorption, desorption, ion exchange, precipitation, dissolution, and redox reactions) of nutrients and inorganic and organic contaminants in soils and organic matter. Chemical complex equilibria and adsorption phenomena at the solid (soil, sediment, and mineral) water interface are emphasized. May also be offered as GEOL 4850 or PES 4850. *Preq:* CH 1020 or PES 2020.

## FOOD SCIENCE

*Professors:* F.H. Barron, K.L. Cason, F. Chen, P.L. Dawson, A.K. Greene, X. Jiang, J.U. McGregor, J.K. Northcutt, A.L. Pometto III, R.L. Thomas; *Associate Professors:* M.D. Condrasky, A.M. Fraser, V.J. Haley-Zitlin; *Senior Lecturers:* A.D. Coffee, H.P. Batt, R.M. Haliena; *Adjunct Professor:* R.J. Vander Zanden; *Adjunct Associate Professors:* K.M. Keener, D.P. Smith; *Adjunct Assistant Professors:* P.S. Manhiani, G.G. Pearl, E.J. Rhodehamel, P. Wan, K.A. Young; *Adjunct Instructors:* R.R. Perdue, L.J. Pfahl, K.G. Schwartz

**FDSC 1010 Introduction to Food Science and Human Nutrition 1** (1) Introductory course providing an overview of career opportunities in both food science and human nutrition disciplines. Provides an orientation to principles related to food and human nutrition.

**FDSC 1020 Perspectives in Food and Nutrition Sciences 1** (1) Discussion course covering topics related to food science and human nutrition. Subjects include topics of current interest and involve familiarization with scientific literature in nutrition and food sciences. *Preq:* Food Science major or minor.

**FDSC 2010 Man and His Food 2** (2) Study of food and food products emphasizing nutrients, nutrient needs, and the relationship between nutrient intake and health. Also discusses food additives, nutritional awareness (including nutrition labeling), food protection, and the influence of processing on nutritional quality of food.

**FDSC 2140 Food Resources and Society 3** (3) Introduces the basics of food science (food chemistry, food microbiology, and food processing principles) and relates how advances in food science have paralleled societal advances and created social controversy.

**FDSC 2150 Culinary Fundamentals 2** (1) Emphasizes the safe handling of food utilizing recognized procedures in equipment safety and sanitation. Cooking methods are investigated, along with ingredient functionality and flavor development. Organizational skills utilized in a real-world environment assist students in preparing, presenting and evaluating their finished products. *Preq:* Food Science major. *Coreq:* FDSC 2151.

- FDSC 2151 Culinary Fundamentals Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 2150. *Preq:* Food Science major. *Coreq:* FDSC 2150.
- FDSC 2160 Fundamentals of Baking Science** 2 (1) Emphasizes the science of baking, ingredient functionality, formulas and Bakers Percentages, and various mixing methods used to produce an array of baked products. Organizational skills, utilized in a real world environment, assist students in preparing, presenting and evaluating their finished products. *Preq:* Food Science major. *Coreq:* FDSC 2161.
- FDSC 2161 Fundamentals of Baking Science Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 2160. *Preq:* Food Science major. *Coreq:* FDSC 2160.
- FDSC 2500 Culinary Science Internship** 0 (0) Students experience the science and art of food preparation, with the ultimate object of improving the ease of manufacture as well as the overall quality and nutrition of the food produced. Students are able to observe, interact, and practice principles of culinary sciences. To be taken Pass/No Pass only. *Preq:* FDSC 2150.
- FDSC 3010 Food Regulation and Policy** 1 (1) Identifies the role of the FDA and FSIS in food regulations, regulatory compliance and enforcement. Other agencies involved in peripheral decisions are also discussed (U.S. Customs, EPA, USDA-AMS, USDA-APHIS, etc.) Introduces food safety concepts, such as HACCP, GMPs, SSOPs, and food defense/security. *Preq:* Food Science major or minor or Packaging Science major or minor; and FDSC 2140 and BCHM 3050.
- FDSC 3040 Evaluation of Dairy Products** 2 (1) Emphasizes sensory evaluation of dairy products. Discusses basic principles of organoleptic evaluation, fundamental rules for scoring and grading dairy products; evaluation of all classes of dairy products based on established grades and score cards. *Preq:* Food Science major or minor. *Coreq:* FDSC 3041.
- FDSC 3041 Evaluation of Dairy Products Laboratory** 0 (2) Non-credit laboratory to accompany FDSC 3040. *Coreq:* FDSC 3040.
- FDSC 3060 Institutional Foodservice Management** 3 (3) Principles of management of resources in institutional food service systems. Emphasizes financial management, menu planning, principles of quantity food production, and safety and sanitation. *Preq:* Food Science major.
- FDSC 3070 Restaurant Food Service Management** 3 (3) Essentials of successful operation of restaurants, including menu design and pricing, marketing, customer satisfaction, purchasing, kitchen operations, and employment relationships.
- FDSC 3500 Food Science Internship** 0 (0) Summer internship offered by the Food, Nutrition and Packaging Sciences Department and the Clemson Micro-Creamery and Food Manufacturing Industries. Students observe, interact, and practice principles of food science within the food industry. To be taken Pass/No Pass only. *Preq:* FDSC 2140.
- FDSC 4010\* Food Chemistry I** 3 (3) Basic composition, structure, and properties of food and the chemistry of changes occurring during processing utilization. Includes Honors sections. *Preq:* BCHM 3050; and Food Science major or minor or Packaging Science major or minor.
- FDSC 4020\* Food Chemistry II** 3 (3) Application of theory and procedures for quantitative and qualitative analysis of food ingredients and food products. Methods for protein, moisture, lipid, carbohydrate, ash, fiber, rancidity, color, and vitamin analyses and tests for functional properties of ingredients are examined. Includes Honors sections. *Preq:* BCHM 3050; and Food Science major or minor.
- FDSC 4030\* Food Chemistry and Analysis** 2 (1) Principles of analytical procedures and techniques used to quantitatively and qualitatively determine chemical composition of foods, and elucidate the physio-chemical properties of food materials. Laboratories provide experience in critical thinking, performing food analysis, and analyzing data. *Preq:* BCHM 3050 and BIOL 4340 and FDSC 2140; and Food Science major or minor. *Coreq:* FDSC 4031.
- FDSC 4031\* Food Chemistry and Analysis Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 4030. *Coreq:* FDSC 4030.
- FDSC 4040\* Food Preservation and Processing** 3 (3) Principles of food preservation applied to flow processes, ingredient functions, and importance of composition and physical characteristics of foods related to their processing; product recalls and product development concepts. *Preq:* Food Science major or minor or Packaging Science major or minor; and BCHM 3050; and either FDSC 2140 or FDSC 3010; and one of PHYS 1220 or PHYS 2000 or PHYS 2070.
- FDSC 4060\* Food Preservation and Processing Laboratory I** 1 (3) Laboratory exercises on preservation methods, equipment utilized, and processes followed in food manufacture. *Preq:* FDSC 4040.
- FDSC 4070\* Quantity Food Production** 2 (1) Principles of the production of food in quantity for use in food service systems. Emphasizes functions of components of foods and of ingredients in food, and focuses on the quality of the final product, on safe production of food, and on proper use of equipment. *Preq:* Food Science major or minor, or Packaging Science major or minor. *Coreq:* FDSC 4071.
- FDSC 4071\* Quantity Food Production Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 4070. *Coreq:* FDSC 4070.
- FDSC 4080\* Food Process Engineering** 4 (3) Study of basic engineering principles and their application in food processing operations. Emphasizes the relation between engineering principles and fundamentals of food processing. *Preq:* Food Science major or minor; and CH 1020 and FDSC 2140; and one of MATH 1020 or MATH 1060; and one of PHYS 1220 or PHYS 2000 or PHYS 2070. *Coreq:* FDSC 4081.
- FDSC 4081\* Food Process Engineering Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 4080. *Coreq:* FDSC 4080.
- FDSC 4090\* Total Quality Management for the Food and Packaging Industries** 3 (3) Introduction to the principles of modern quality management emphasizing quality standards and issues and the practices necessary for food processing and packaging companies to survive in a customer-driven marketplace. May also be offered as PKSC 4090.
- FDSC 4100\* Food Product Development** 4 (3) A strategic and systems approach to integrated product development practices for developing new food products within a team setting. Focuses on the Stage-Gate process for moving from product idea to launch and application of sensory analysis techniques. *Preq:* Food Science major or minor; and Junior standing. *Preq or concurrent enrollment:* FDSC 4030. *Coreq:* FDSC 4101.
- FDSC 4101\* Food Product Development Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 4100. *Coreq:* FDSC 4100.
- FDSC 4170 Seminar** 1 (1) Literature research and oral presentation of a current food science topic. *Preq:* Food Science major.
- FDSC 4180 Seminar** 1 (1) Literature research and oral presentation of a current food science topic.
- FDSC 4200 Special Topics in Food Science** 1-3 (1-3) Special topics in food science not covered in other courses. May be repeated for a maximum of 12 credits, but only if different topics are covered. Includes Honors sections. *Preq:* Consent of instructor.
- FDSC 4210 Special Problems in Food Science** 1-4 (1-4) Independent research investigation in food science areas not conducted in other courses. May be repeated for a maximum of 12 credits. Includes Honors sections. *Preq:* Consent of instructor.
- FDSC 4300\* Dairy Processing and Sanitation** 3 (2) Processing, manufacture and distribution of fluid, frozen, cultured and other dairy products. Emphasizes sanitation in a commercial food processing plant environment, chemical and microbiological aspects, processing procedures, equipment operation, ingredient applications, formulation and functional properties. *Preq:* BIOL 1040 and BIOL 1060 and CH 1020. *Coreq:* FDSC 4301.
- FDSC 4301\* Dairy Processing and Sanitation Laboratory** 0 (3) Non-credit laboratory to accompany FDSC 4300. *Coreq:* FDSC 4300.
- FDSC 4500 Creative Inquiry—Food Science** 1-6 (1-6) Individual or small team research experience in close collaboration with a faculty member. Expands undergraduate learning by application of the scientific method. Research is selected by the student with approval of faculty. May be repeated for a maximum of ten credits.
- FDSC 4910 Practicum** 1-4 (1-4) Supervised experiential opportunities in the food industry. May be repeated for a maximum of 12 credits. *Preq:* Food Science major and Junior standing and consent of department chair.

## FINANCE

*Professors:* J.C. Alexander Jr., M.F. Spivey, T.M. Springer, N.G. Waller; *Associate Professors:* J.M. Harris Jr., A.G. Morgan, J.R. Pierce, J.G. Wolf, F. Xie; *Assistant Professors:* D.T. Greene, G.B. Lockhart, T. Tang; *Lecturer:* K.D. McMillan

**FIN 3010 Personal Finance** 3 (3) Analysis of the preparations of personal financial plans. Topics include savings and budgeting, personal taxes, housing and automobile decisions, loans, insurance needs, investments, and retirement needs. May not be counted toward a major or minor in Financial Management.



- FIN 3040 Risk and Insurance** 3 (3) Studies the nature of risk and the role of insurance in risk management from individual and business viewpoints. Topics include probability, theory of the firm under uncertainty, insurance carriers and contracts, underwriting, and regulation. *Preq:* FIN 3060 or FIN 3110.
- FIN 3050 Investment Analysis** 3 (3) Study of techniques useful in analyzing alternative investment opportunities with emphasis on corporate securities. Investment planning and portfolio management are considered. *Preq:* FIN 3060 or FIN 3110, each with a C or better.
- FIN 3060 Corporation Finance** 3 (3) Introduction to financial management of nonfinancial firms. Includes such topics as analysis of financial statements, financial forecasting, capital budgeting, working capital management, and long-term financing decisions. Credit may not be received for both FIN 3060 and FIN 3110. *Preq:* ACCT 2010; and one of the following courses: IE 3610 or MATH 3020 or PSYC 3090 or STAT 2300 or STAT 3090.
- FIN 3070 Principles of Real Estate** 3 (3) Acquaints students with the theories, practices, and principles that govern real estate markets. Major emphasis is on specifics of real estate brokerage, property rights, and ownership; making real estate investment decisions; and financing real estate investments. *Preq:* FIN 3060 or FIN 3110, each with a C or better.
- FIN 3080 Financial Institutions and Markets** 3 (3) Study of the various types of financial institutions and of topics critical to the financial institutions practitioner. Topics include financial regulations, financial security types and their yields, interest rate risk management, foreign currency risks management, and stock index futures. *Preq:* FIN 3060 or FIN 3110, each with a C or better.
- FIN 3110 Financial Management I** 3 (3) First in a two-course sequence to provide in-depth exposure to the theory and practice of corporate financial management and to demonstrate how financial management techniques are applied in decision making. Credit may not be received for both FIN 3060 and FIN 3110. Includes Honors sections. *Preq:* ACCT 2010 and 2040, each with a C or better; and one of the following: IE 3610 or MATH 3020 or PSYC 3090 or STAT 3090 or STAT 3300.
- FIN 3120 Financial Management II** 3 (3) Continuation of the two-course sequence that begins with FIN 3110. Includes Honors sections. *Preq:* FIN 3060 or FIN 3110, each with a C or better.
- FIN 3980 Creative Inquiry—Finance** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of faculty member/mentor.
- FIN 3990 Finance Internship** 1-3 (1-3) Pre-planned, preapproved, faculty-supervised internships to give students on-the-job learning in support of classroom education. Internships must be no fewer than six full-time, consecutive weeks with the same internship provider. Restricted to students with a major or minor in Financial Management. To be taken Pass/No Pass only. *Preq:* Consent of instructor.
- FIN 4020\* Corporate Valuation** 3 (3) Study of the decision process and analytical techniques used in evaluating corporate investment and financing decisions. Topics include capital budgeting, capital structure and bankruptcy, valuation, corporate governance, executive compensation, mergers and acquisitions, and restructuring. Includes Honors sections. *Preq:* FIN 3120 with a C or better.
- FIN 4040 Financial Modeling** 3 (3) Helps students develop the practical skills that combine theory, business planning, and forecasting needed to make financial decisions. Emphasizes the use of spreadsheet software used to set up and solve these models. Topics include financial statement analysis, valuation, and cost of capital. Includes Honors sections. *Preq:* FIN 3120 with a C or better; and either CPSC 2200 or MGT 2180.
- FIN 4050 Portfolio Management and Theory** 3 (3) Introduction to portfolio management. Includes the underlying theory, managing the equity and the fixed-income portfolios, portfolio evaluation options-pricing theory, futures markets and instruments. Includes Honors sections. *Preq:* FIN 3050 with a C or better.
- FIN 4060\* Analysis and Use of Derivatives** 3 (3) Consideration of the option pricing theory and strategy techniques most commonly used in the market for options. Also considers an overview of the futures markets. Special emphasis is given to interest-rate futures, stock-index futures, and foreign-exchange futures. Includes Honors sections. *Preq:* FIN 3050 with a C or better.
- FIN 4080 Management of Financial Institutions** 3 (3) Detailed study of the operational, marketing, and regulatory aspects of the management of depository financial institutions. Emphasizes decision making through the extensive use of cases. *Preq:* FIN 3080 with a C or better.
- FIN 4090 Professional Financial Planning** 3 (3) Concepts and practical implementation of professional financial planning focusing on essentials of budgeting and saving, risk management, tax planning, investment planning, and retirement and estate planning. Emphasizes integrating these elements into a comprehensive personal financial plan. *Preq:* ACCT 4040 and ACCT 4080 and FIN 3040 and FIN 3050.
- FIN 4100 Research in Finance** 1-3 (1-3) Directed research for students interested in careers in finance. Research topic is selected by student and approved by instructor. A formal research paper is required. Includes Honors sections. *Preq:* FIN 3060 or FIN 3120; and consent of instructor.
- FIN 4110 International Financial Management** 3 (3) Extension of the principles of finance to the international context. Focuses on implications of the existence of multiple currencies and the operations across borders of sovereign nation-states for the multinational corporation. *Preq:* FIN 3060 or 3120 with a C or better.
- FIN 4150\* Real Estate Investment** 3 (3) Focuses on the structure and analysis of real estate investment emphasizing financial theory and analysis technique. Case study and project-oriented homework assignments facilitate the understanding of real estate investments. *Preq:* FIN 3070 with a C or better.
- FIN 4160\* Real Estate Valuation** 3 (3) Advanced course in commercial real estate valuation. Topics include income capitalization, cash equivalency, highest and best use analysis, the cost approach, the direct sales comparison approach, and DCF analysis. *Preq:* FIN 3070 with a C or better.
- FIN 4170\* Real Estate Finance** 3 (3) Advanced course applying financial analysis and theory to real estate. Emphasizes mortgage credit analysis and current financing techniques for residential and commercial properties. Topics include financial institutions, syndications, and construction financing. *Preq:* FIN 3070 with a C or better.
- FIN 4980 Creative Inquiry—Finance** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of faculty member/mentor.

## FORESTRY AND NATURAL RESOURCES

*Professors:* J.D. Lanham, P.A. Layton, *Director*; G.K. Yarrow; *Associate Professors:* R.F. Baldwin, W.R. English, E. Mikhailova, C.J. Post; *Extension Associate:* R.D. Willey

**FNR 1020 Forestry and Natural Resources Freshman Portfolio** 1 (1) Informative sketch of forestry, wildlife biology, and natural resources; education and career opportunities for natural resource professionals. Students initiate their Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate degree. To be taken Pass/No Pass only. Restricted to students enrolled in one of the following majors: Environmental and Natural Resources; or Forest Resource Management; or Wildlife and Fisheries Biology.

**FNR 2040 Soil Information Systems** 4 (3) Includes input, storage, analysis, and output of soil information through the use of global positioning systems, direct/remote sensing, geographic information systems, and web soil survey. Provides fundamental knowledge of the role of soils in forest and wildlife management. *Preq:* One of the following combinations: CH 1010 and CH 1020; or CH 1050 and CH 1060. *Coreq:* FNR 2041.

**FNR 2041 Soil Information Systems Laboratory** 0 (3) Non-credit laboratory to accompany FNR 2040. *Coreq:* FNR 2040.

**FNR 4660\* Stream Ecology** 3 (2) Covers the ecology of flowing water systems. Topics include geomorphology, physical and chemical factors of streams, biology of stream-dwelling organisms, trophic relationships, competition, colonization, drift, community structure, disturbance, and human impacts. *Preq:* Junior standing. *Coreq:* FNR 4661.

**FNR 4661\* Stream Ecology Laboratory** 0 (3) Non-credit laboratory to accompany FNR 4660. *Coreq:* FNR 4660.

**FNR 4700 Creative Inquiry 1-3 (1-3)** Multi-semester commitment to participate in forestry and natural resources research with a group of peers, mentored by a faculty member or advanced graduate student. Students learn to collect, analyze, evaluate, and present information. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**FNR 4900 Field Training in Natural Resources 3 (9)** Four to eight week internship in which students work in natural resources. Students have supervised management responsibility. Total of 1350 hours required. Must be arranged at least two months in advance. To be taken Pass/No Pass only. *Preq:* Senior standing in one of the following majors: Environmental and Natural Resources; or Forestry; or Wildlife and Fisheries Biology.

**FNR 4910 Senior Honors Thesis I 3 (3)** Individual research for students in the Forestry and Natural Resources Honors Program. Focuses on developing a plan of research under the direction of a faculty advisory committee. *Preq:* Senior standing, membership in Calhoun Honors College, and consent of instructor.

**FNR 4920 Senior Honors Thesis II 3 (3)** Individual natural resources research for students in the Forestry and Natural Resources Honors Program. Focuses on data collection, analysis, report writing, and oral presentation. *Preq:* FNR 4910.

**FNR 4990 Natural Resources Seminar 1 (1)** Exploration of current literature and research in natural resources. Students participate in the analysis of research findings, utilizing skills acquired in their undergraduate programs. May be repeated for maximum of two credits.

## FORESTRY

*Professors:* W.H. Conner, J.D. Lanham, P.A. Layton, *Director;* J.H. Rodgers Jr., T.J. Straka, G.G. Wang, G.K. Yarrow; *Associate Professors:* R.F. Baldwin, W.R. English, L.R. Gering, A.R. Johnson, E. Mikhailova, C.J. Post, R.B. Powell, C.E. Wells; *Assistant Professor:* T. Cushing; *Lecturer:* D. Hagen; *Extension Associate:* R. Polomski

**FOR 1010 Introduction to Forestry 1 (1)** Informative sketch of forestry, forests, and forestry tasks of the nation. Includes education and career opportunities for foresters. Offered fall semester only.

**FOR 2050 Dendrology 2 (1)** Classification, nomenclature, and identification of the principal forest trees of the United States, their geographical distribution, ecological requirements, and economic importance. Includes field identification of native trees and commonly planted exotics of the Southeast. *Preq:* BIOL 1030 and BIOL 1050. *Coreq:* FOR 2051 and FOR 2210.

**FOR 2051 Dendrology Laboratory 0 (3)** Non-credit laboratory to accompany FOR 2050. *Coreq:* FOR 2050.

**FOR 2060 Forestry Ecology 3 (2)** Study of the nature of forests and forest trees, how they grow, reproduce, and their relationships to the physical and biological environment. Offered spring semester only. *Preq:* BIOL 1030 and BIOL 1050; or CSEN 2020; or FOR 2050. *Coreq:* FOR 2061.

**FOR 2061 Forestry Ecology Laboratory 0 (3)** Non-credit laboratory to accompany FOR 2060. *Coreq:* FOR 2060.

**FOR 2210 Forest Biology 3 (3)** Study of woody plant form and function, wood properties, general physiology and forest biomes of North America. Presented as a companion course to dendrology lab. *Preq:* BIOL 1030 and BIOL 1050. *Coreq:* FOR 2050.

**FOR 2270 Arboricultural Field Techniques 1 (3)** Skills and techniques required to safely climb trees for tree maintenance. Emphasizes safety, proper equipment, and basic tree maintenance treatments. To be taken Pass/No Pass only.

**FOR 2510 Forest Communities 2 (6)** Study of forest plant species and their successful status and habitat requirements with respect to landform, soil type, and other appropriate aspects of site classification. *Preq:* FOR 2050.

**FOR 2520 Forest Operations 1 (3)** Introduction and tour of forest operations activities throughout South Carolina. Includes timber harvesting, site preparation, and applied silvicultural processes. *Preq:* Junior standing.

**FOR 2530 Forest Mensuration 4 (12)** Introduction to measurements of land, individual trees, forest stands, forest products, and the application of mensurational techniques to the statistical and physical design of forest sampling methods, including measurement techniques of non-timber components of forest resources. *Preq:* FOR 2050.

**FOR 2540 Forest Products (Summer Camp) 1 (3)** Tour of the forest products industry of South Carolina emphasizing those products and processes of some distinction or special interest. *Preq:* FOR 2050.

**FOR 3000 Christmas Tree Production 2 (2)** Theory and practice of establishing, managing, and marketing trees emphasizing Christmas tree production in the South. *Preq:* Consent of instructor.

**FOR 3020 Forest Biometrics 2 (1)** Application of statistical methods to forestry problems, including sampling theory and methods, growth measurements and prediction, and application of micro-computing to analysis of forestry data. *Preq:* FOR 2530. *Preq or concurrent enrollment:* STAT 2300. *Coreq:* FOR 3021.

**FOR 3021 Forest Biometrics Laboratory 0 (3)** Non-credit laboratory to accompany FOR 3020. *Coreq:* FOR 3020.

**FOR 3040 Forest Resource Economics 3 (3)** Economic problems and principles involved in the utilization of forest resources and distribution of forest products. Includes analysis of integrated forest operations. *Preq:* APEC 2570 or ECON 2000 or ECON 2110 or ECON 2120.

**FOR 3050 Woodland Management 3 (2)** Compendium of forestry subjects providing a broad view of the forest environment as it relates to ecology, management, and utilization of forests, especially those of S.C. Field and laboratory exercises in the fundamentals of forest-land management. Not open to Forest Resource Management majors. *Preq:* BIOL 1030 and BIOL 1050. *Coreq:* FOR 3051.

**FOR 3051 Woodland Management Laboratory 0 (2)** Non-credit laboratory to accompany FOR 3050. *Coreq:* FOR 3050.

**FOR 3080 Remote Sensing in Forestry 2 (1)** Introduction to remote sensing, aerial photo interpretation, computer mapping, aerial photo timber estimating, and geographical information systems. *Preq:* FOR 2510 and FOR 2520 and FOR 2530 and FOR 2540. *Coreq:* FOR 3081.

**FOR 3081 Remote Sensing in Forestry Laboratory 0 (3)** Non-credit laboratory to accompany FOR 3080. *Coreq:* FOR 3080.

**FOR 3140 Harvesting and Forest Products 4 (3)** Harvesting of forest products, structure and properties of economically important timbers, and production and properties of primary forest products. *Preq:* FOR 2510 and FOR 2520 and FOR 2530 and FOR 2540. *Coreq:* FOR 3141.

**FOR 3141 Harvesting and Forest Products Laboratory 0 (3)** Non-credit laboratory to accompany FOR 3140. *Coreq:* FOR 3140.

**FOR 3150 Woodland Ecology 3 (3)** Overview of the forest emphasizing living and nonliving components of the woodland habitat. Understanding man's use of the forest and interpreting the signs of plants, wildlife, and landscapes.

**FOR 3410 Wood Procurement Practices in the Forest Industry 3 (3)** Study of wood raw material procurement practices currently employed by the forest products industry, including pulp, paper, and related areas. *Preq:* FOR 2510 and FOR 2520 and FOR 2530 and FOR 2540.

**FOR 4000\* Public Relations in Natural Resources 3 (3)** Identifying relevant policies, their characteristics and acceptance to natural resource management, and techniques of maintaining appropriate public relations. *Preq:* Senior standing.

**FOR 4060 Forested Watershed Management 2 (1)** Lectures and discussions on measurements and processes affecting water quality and quantity within watersheds. Introduction to hydrologic principles, geomorphology, and water quality assessment. Discusses best management practices for silviculture and development of a watershed management plan. *Preq:* FOR 3150. *Coreq:* FOR 4061.

**FOR 4061 Forested Watershed Management Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4060. *Coreq:* FOR 4060.

**FOR 4080\* Wood and Paper Products 3 (3)** Study of wood structures and identification; physical and mechanical properties of wood products; standard testing procedures; manufacture of lumber, plywood, oriented strand board; drying, preservation, grading, and use of wood products. Also discusses common grades of paper and paperboard; fiber sources; pulping and paper-making equipment and processes; chemical recovery process; and environmental issues. *Preq:* Junior standing.

**FOR 4100\* Harvesting Processes 4 (3)** Study of forest harvesting processes with detailed analysis of production, cost, environmental impacts, safety, transportation, and business considerations. *Preq:* Senior standing. *Coreq:* FOR 4101.

**FOR 4101\* Harvesting Processes Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4100. *Coreq:* FOR 4100.

- FOR 4130\* Integrated Forest Pest Management 4 (3)** Nature and control of pests of forest trees and products. Focuses on the relation of pests to silviculture, management, and natural forest ecosystems. *Prq:* Junior standing in Forest Resource Management field of study. *Coreq:* FOR 4131.
- FOR 4131\* Integrated Forest Pest Management Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4130. *Coreq:* FOR 4130.
- FOR 4150\* Forest Wildlife Management 3 (2)** Principles, practices, and problems of wildlife management emphasizing upland forest game species. Habitat manipulation through use of appropriate silvicultural practices in association with other techniques is evaluated. *Prq:* FOR 4600. *Coreq:* FOR 4151.
- FOR 4151\* Forest Wildlife Management Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4150. *Coreq:* FOR 4150.
- FOR 4160\* Forest Policy and Administration 3 (3)** Introduction to the development, principles, and legal provisions of forest policy in the United States and an examination of administrative and executive management in forestry. May also be offered as ENR 4160.
- FOR 4170\* Forest Resource Management and Regulation 3 (3)** Fundamental principles and analytical techniques in planning, management, and optimization of forest operations. *Prq:* FOR 3020 and FOR 3080 and FOR 4180 and FOR 4650.
- FOR 4180\* Forest Resource Valuation 3 (3)** Analysis of capital investment tools and their application to decision making among forestry investment alternatives; valuation of land, timber, and other resources associated with forestry, including the impact of inflation and taxes. *Prq:* FOR 3040.
- FOR 4190 Senior Problems 1-3 (1-3)** Problems chosen with faculty approval in selected areas of forestry. With department chair's approval, may be repeated once for credit. *Prq:* Senior standing.
- FOR 4230\* Current Issues in Natural Resources 2 (2)** Lectures in various fields of forestry delivered by selected representatives from forest industries, consultants, agencies, associations, and other forestry operations. Will not be taught when enrollment is less than 15. To be taken Pass/No Pass only. *Prq:* Junior standing.
- FOR 4250 Forest Resource Management Plans 2 (1)** Development of multiple resource forest management plans. Economic and environmental impacts of implementing management plans. *Prq:* FOR 4170. *Coreq:* FOR 4251.
- FOR 4251 Forest Resource Management Plans Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4250. *Coreq:* FOR 4250.
- FOR 4260 Forest Resource Management Plans Seminar 1 (1)** In-depth exploration of topics and problems presented in FOR 4250. To earn honors credit, students must be enrolled in corequisite FOR 4250 and earn a B or better in both courses. Includes Honors sections. *Prq:* Senior standing and consent of instructor. *Prq or concurrent enrollment:* FOR 4250.
- FOR 4270\* Urban Tree Care 3 (3)** Principles, practices, and problems of protecting and maintaining trees in urban and recreational areas. Examines environmental and biological factors affecting trees in high-use areas, their management and cultural requirements, and the practices necessary for their protection and care as valuable assets in the landscape. May also be offered as HORT 4270. *Prq:* FOR 2050 or HORT 3030.
- FOR 4310\* Recreation Resource Planning in Forest Management 2 (1)** Analysis of forest recreation as a component of multiple-use forest management; techniques of planning; physical and biological effects on forest environments; and forest site, user, and facility management. *Coreq:* FOR 4311.
- FOR 4311\* Recreation Resource Planning in Forest Management Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4310. *Coreq:* FOR 4310.
- FOR 4330\* GPS Applications 3 (2)** Develops competence in global positioning system (GPS) technology, including theory, methods, and application to natural resources mapping. Topics include basic concepts of GPS; projection systems; types of data; mission planning; and data capture, correction, and export to geographical information systems (GIS). *Prq:* Senior standing. *Coreq:* FOR 4331.
- FOR 4331\* GPS Applications Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4330. *Coreq:* FOR 4330.
- FOR 4340\* Geographic Information Systems for Landscape Planning 3 (2)** Develops competence in geographic information systems (GIS) technology and its application to various spatial analysis problems in landscape planning. Topics include data development and management, spatial analysis techniques, critical review of GIS applications, needs analysis and institutional context. GIS hardware and software, hands-on application. Credit may be received for only one of ENR 434 or FOR 4340. May also be offered as ENR 4340. *Coreq:* FOR 4341.
- FOR 4341\* Geographic Information Systems for Landscape Planning Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4340. May also be offered as ENR 4341. *Coreq:* FOR 4340.
- FOR 4410\* Properties of Wood Products 3 (3)** Basic properties of wood, including the hygroscopic, thermal, electrical, mechanical, and chemical properties; standard testing procedures for wood. *Prq:* Junior standing.
- FOR 4420\* Manufacture of Wood Products 3 (3)** Study of the manufacture of lumber, plywood, poles, piles; drying, preservation, grading, and uses of wood products. Considers the manufacture of particleboard, flakeboard, oriented-strand board, fiberboard, and paper products. Includes physical, mechanical, and chemical properties and their applications. *Prq:* Consent of instructor.
- FOR 4440\* Forest Products Marketing and International Trade 3 (3)** Study of marketing and international trade practices currently employed by the forest products industry and the application of basic marketing principles and global trade concepts in the industry's current and future environment. *Prq:* FOR 4420.
- FOR 4470 Special Problems in Forest Products 1-3 (1-3)** Laboratory, library, or field study of problems in selected areas of forest products. Emphasizes the planning and execution of research and the reporting of results. Research must be conducted under the guidance of a Forest Products faculty member. May be repeated for a maximum of three credits, but only if different topics are covered. *Prq:* Senior standing and consent of instructor.
- FOR 4500\* Woody Plant Stress Physiology 3 (3)** Structure, function, and physiology of tree shoot and crown growth, wood formation, diameter growth, root growth, and reproduction, especially as related to stress factors. *Prq:* BIOL 4010 or FOR 4600.
- FOR 4510\* Newman Seminar and Lecture Series in Natural Resources Engineering 1 (2)** Topics dealing with development and protection of land, air, water, and related resources are covered by seminar with instructor and invited lecturers. Current environmental and/or resource conservation issues are addressed. Includes Honors sections. May also be offered as BE 4510 or EES 4510. *Prq:* Senior standing.
- FOR 4610 Silviculture Honors Seminar I 1 (1)** In-depth exploration of topics and problems presented in FOR 4650. To earn honors credit, students must be enrolled in FOR 4650 and earn a B or better in both courses. *Prq:* Junior standing and consent of instructor. *Prq or concurrent enrollment:* FOR 4650.
- FOR 4630 Silviculture Honors Seminar II 1 (1)** In-depth exploration of topics and problems presented in FOR 4650. To earn honors credit, students must be enrolled in FOR 4650 and earn a B or better in both courses. *Prq:* Junior standing and consent of instructor. *Prq or concurrent enrollment:* FOR 4650.
- FOR 4650\* Silviculture 4 (3)** Discussion of the theory and practice of manipulating forests to meet the needs and values of landowners and society in accordance with biological, ecological, and economic principles. *Prq:* FOR 2060 and FOR 2510 and FOR 2520 and FOR 2530 and FOR 2540. *Coreq:* FOR 4651.
- FOR 4651\* Silviculture Laboratory 0 (3)** Non-credit laboratory to accompany FOR 4650. *Coreq:* FOR 4650.
- FOR 4800 Selected Topics in Urban Forestry 1-3 (1-3)** Study of selected and varied topics, problems, and issues in urban forestry and arboriculture through readings, class discussion, and individual and group projects. *Prq:* FOR 4270 or HORT 4270.
- FOR 4930 Selected Topics in Forest Resources 1-15 (1-15)** Specialized topics not covered in other courses that explore current areas of research and management in forest resources in a format of lecture, lab, or both. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Prq:* Junior standing.
- FOR 4980 Senior Portfolio 1 (1)** Collection of Web-based materials representing the creative and scientific papers, presentations, and résumés written by students to satisfy curriculum requirements. Students are informed in FNR 1020 and regularly thereafter regarding the format and content of their portfolios. *Prq or concurrent enrollment:* FOR 4250.

**FRENCH**

*Professors:* C.K. Nakuma, *Associate Dean*; K.M. Szurlo; *Assistant Professors:* J.H. Mai, K.D. Peebles, E.R. Touya; *Lecturers:* S.D. Clay, C. Haight, H.G. Newton, A. Sawyer

- FR 1010 Elementary French 4 (3)** Multimedia course for beginners that combines video, audio, and print to teach the fundamentals of the French language and culture. Emphasizes communicative proficiency (listening comprehension, speaking, reading, and writing). *Coreq:* FR 1011.
- FR 1011 Elementary French Laboratory 0 (1)** Non-credit laboratory to accompany FR 1010. *Coreq:* FR 1010.
- FR 1020 Elementary French 4 (3)** Continuation of FR 1010; three hours a week of classroom instruction and one hour a week in the language laboratory. *Coreq:* FR 1021.
- FR 1021 Elementary French Laboratory 0 (1)** Non-credit laboratory to accompany FR 1020. *Coreq:* FR 1020.
- FR 1040 Basic French 4 (3)** Intensive one-semester program combining FR 1010 and 1020 for students who have previously studied French. Includes fundamentals of grammar and vocabulary as a foundation for building written and oral proficiency. *Coreq:* FR 1041.
- FR 1041 Basic French Laboratory 0 (1)** Non-credit laboratory to accompany FR 1040. *Coreq:* FR 1040.
- FR 1510 French for Graduate Students 3 (3)** Intensive program only for graduate students preparing for the reading examination in French. A minimum grade of *B* on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/No Pass only. *Preq:* Graduate standing.
- FR 2010 Intermediate French 3 (3)** Brief review of FR 1010 and 1020, with conversation, composition, and dictation, and the beginning of more serious reading of French prose. Includes literary and cultural perspectives. Includes Honors sections. *Preq:* FR 1020. *Coreq:* FR 2011.
- FR 2011 Intermediate French Laboratory 0 (1)** Non-credit laboratory to accompany FR 2010. *Coreq:* FR 2010.
- FR 2020 Intermediate French 3 (3)** Emphasizes reading nontechnical French prose more rapidly. Writing, speaking, and listening skills continue to be developed. Includes literary and cultural perspectives. Includes Honors sections. *Preq:* FR 2010. *Coreq:* FR 2021.
- FR 2021 Intermediate French Laboratory 0 (1)** Non-credit laboratory to accompany FR 2020. *Coreq:* FR 2020.
- FR 2970 Creative Inquiry—French 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.
- FR 2990 Foreign Language Drama Laboratory 1 (3)** Participation in foreign drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a maximum of three credits. *Preq:* Consent of instructor directing the play.
- FR 3000 Survey of French Literature 3 (3)** Study of selected masterpieces of French literature in their artistic, cultural, and historical context. May include theme and genre studies. *Preq:* FR 2020.
- FR 3040 French Short Story 3 (3)** Introduction to the study of French narrative literature and the elements of critical analysis through the examination of short stories spanning the medieval era to the present from both France and Francophone countries. *Preq:* FR 3050.
- FR 3050 Intermediate French Conversation and Composition I 3 (3)** Practice in the spoken language stressing vocabulary building, pronunciation, intonation, and comprehension. Requires written work to increase accuracy and assignments in the language laboratory. *Preq:* FR 2020.
- FR 3060 Intensive Language and Culture in Belgium 3 (3)** Intensive one-semester course for students participating in the Clemson French Immersion program in Belgium. Includes the study of language and Belgian cultural heritage with an emphasis on integration into local student life, immersion in contemporary Belgian society, and participation in cultural traditions. *Preq:* FR 3050.
- FR 3070 French Civilization 3 (3)** Study of significant aspects of French culture from its origins to the present. *Preq:* FR 3050.
- FR 3080 French Linguistics I: Phonetics, Phonology, and Morphology 3 (3)** Study of the fundamental sound patterns, melodic structure, and work-formation processes of modern standard French. *Preq:* FR 3040 or FR 3050.
- FR 3090 French Linguistics II: Syntax and Semantics 3 (3)** Study of the fundamental structures of French syntax and semantics. *Preq:* FR 3040 or FR 3050.
- FR 3100 Summer Immersion Program 6 (6)** Conducted entirely in French for eight hours daily, this summer immersion program consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of FR 2020. *Preq:* FR 2010.
- FR 3120 Writing in French I 3 (3)** Study of the vocabulary, syntax, and stylistics in short compositions and creative papers in French, on both fiction and non-fiction topics. *Preq:* FR 2020.
- FR 3160 French for International Trade I 3 (3)** Spoken and written French common to the French-speaking world of business and industry, emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analyses of American and French cultural patterns in a business setting. *Preq or concurrent enrollment:* FR 2020 and FR 3050.
- FR 3170 Contemporary French Civilization 3 (3)** Study of significant aspects of France today; the country, its economy, government, and society. Taught in French. *Preq:* FR 3050.
- FR 3200 Studies in French Theatre 3 (3)** Explores a variety of genres (medieval farce, classical comedy and tragedy, romantic melodrama, and the Nouveau Thibtre) with emphasis on staging. Class materials consist of scripts, videotaped performances, and theoretical readings on issues pertaining to spectacle in social, political, and artistic terms. May be repeated for a maximum of six credits. *Preq:* FR 2020.
- FR 3570 Selected Topics in the Culture of Paris 3 (3)** On-site study of Paris and its relationship to France and Europe through readings, lectures, field trips, small student-group explorations, and reporting sessions. All activities are conducted in French. *Preq:* FR 2020.
- FR 3630 French and Francophone Poetry 3 (3)** Study of traditions and major works of French and/or Francophone poetry in their historical, cultural, and aesthetic contexts. Topics may include genres, periods, traditions (romanticism, symbolism, cubism, surrealism), or themes. *Preq:* FR 3050.
- FR 3830 French-Language News 1 (1)** Weekly discussions of French-language news articles in the foreign press with an emphasis on politics and the connections among political, social, economic, and cultural trends. Emphasizes French vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. May also be offered as POSC 3830. *Preq:* FR 2020.
- FR 3910 Survey of French Literature (Honors) 1 (1)** One-hour independent study to allow honors students to pursue supervised research on a topic relating to the literary, cultural, and artistic movement in France. *Preq:* Membership in Calhoun Honors College. *Preq or concurrent enrollment:* FR 3000.
- FR 3970 Creative Inquiry—French 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- FR 3980 Directed Reading 1-3 (1-3)** Directed study of selected topics in French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- FR 4000 Modern French Literature 3 (3)** Study of selected works of 20th-century French literature in their artistic, cultural, and historical context. *Preq:* FR 2020.
- FR 4090 Writing in French II 3 (3)** Intensive study of syntax and stylistics through composition and translations. *Preq:* Senior standing.
- FR 4100 Francophone Literature 3 (3)** Study of selected works of francophone literature emphasizing Africa and the Caribbean in their artistic, cultural, historical, and political contexts. *Preq:* FR 3000.
- FR 4110 Advanced French Conversation and Composition 3 (3)** Continuation of FR 3050 emphasizing greater fluency and sophistication in oral and written expression. *Preq:* FR 3050.

- FR 4120 French and Francophone Cinema 3 (2)**  
Examination of cinematic practice as a discourse and the role it plays in the representation of social relations, particularly race, ethnicity, class, power, sex, and gender in the French-speaking world. May include a study of major directors, genres, and movements. Taught in French. Films with English subtitles. *Preq:* FR 3050. *Coreq:* FR 4121.
- FR 4121 French and Francophone Cinema Laboratory 0 (3)** Non-credit laboratory to accompany FR 4120. *Coreq:* FR 4120.
- FR 4150 Translation Seminar 3 (3)** Methods and theory of translation and a comparison of French and English structures. Practical exercises in translating from French to English and vice versa in a variety of texts. *Preq:* FR 3050.
- FR 4160 French for International Trade II 3 (3)**  
Study of language and cultural environment of the French-speaking markets of the world, including the linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* FR 3160.
- FR 4200 French Enlightenment, Revolution and Romanticism 3 (3)** Cultural and literary studies of the century and a half (1715–1851) in which France occupied the center stage of world history and its modern institutions came into being. Emphasizes the free intellectual inquiry championed by philosophers and the romantic melancholy in the aftermath of the Revolution. *Preq:* FR 3050.
- FR 4380 French Honors Research 3 (3)** Individual honors research conducted under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages–French or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing and membership in Calhoun Honors College.
- FR 4390 French Honors Thesis 3 (3)** Individual honors research conducted and thesis completed under the direction of Language Department faculty member. May not be used to satisfy requirements for the major in Modern Languages–French or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing and FR 4380 and membership in Calhoun Honors College.
- FR 4750 Advanced French Seminar 3 (3)**  
Concentrated research and discussion on an advanced topic in French literature, film, drama, music, or philosophy. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* FR 3040 or FR 3050 and Senior standing.
- FR 4760 Advanced Seminar on French Thought 3 (3)** Research and discussion of an advanced topic, text, or group of texts with a particular focus on French theory and philosophy but including works of French literature. Conducted in English. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing.
- FR 4770 Advanced Seminar on the French and Francophone Novel 3 (3)** Examination of the French novel and/or narrative prose focusing on a theme, genre, or period. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* FR 3040 or FR 3050 and Senior standing.
- FR 4910 Modern French Literature (Honors) 1 (1)**  
Independent study to allow honors students to pursue in depth an author, work, movement, or genre related to contemporary French culture, art, or literature. *Preq or concurrent enrollment:* FR 4000 and membership in Calhoun Honors College.
- FR 4920 The French Corporation (Honors) 1 (1)** Independent study to allow honors students to pursue an in-depth study of the organization, structure, functions, and economic role of a French business enterprise. *Preq or concurrent enrollment:* FR 4170 and membership in Calhoun Honors College.
- FR 4970 Creative Inquiry–French 1-4 (1-4)**  
Continuation of research initiated in FR 3970. Students complete their projects and disseminate their research results. *Preq:* FR 3970.
- FR 4980 Independent Study 1-3 (1-3)** Directed study of a selected topic in French literature, language, or culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- FR 4990\* Selected Topics in French Literature 3 (3)** Selected topics that have characterized French literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- GRAPHIC COMMUNICATIONS**  
*Professors:* S.T. Ingram, Chair; J.M. Leininger; *Associate Professors:* E.M. Weisenmiller, N.L. Woolbright; *Assistant Professors:* L.H. O'Hara, C.T. Weiss; *Senior Lecturers:* C.D. Jones, B.G. Rose; *Lecturers:* K.T. Cox, E.B. Walker
- GC 1010 Orientation to Graphic Communications 1 (1)** Introduction to the curriculum and the industry, including its processes, products, and careers. Emphasizes the attributes most desirable for successful entry and advancement up a variety of career ladders.
- GC 1020 Computer Art and CAD Foundations 4 (2)** Graphic Communications industries make extensive use of software and best practices from concept through production. This course provides a solid foundation in drawing, imaging and layout software; packaging structure and 3-D CAD; design principles and problem solving relative to audience, need, typography, color, materials, printing and end use. *Coreq:* GC 1021.
- GC 1021 Computer Art and CAD Foundations Laboratory 0 (6)** Non-credit laboratory to accompany GC 1020. *Coreq:* GC 1020.
- GC 1030 Graphic Communications I for Packaging Science 4 (2)** Emphasizes the interrelationships of packaging and graphic arts. Topics include theory and practice in packaging requirements relative to basic graphic arts concepts, principles, and practices; layout; design; electronic copy preparation; the printing processes of offset lithography; screen printing; gravure; and flexography. Includes digital and specialty printing processes, environmental, health, and safety concerns. *Coreq:* GC 1031.
- GC 1031 Graphic Communications I for Packaging Science Laboratory 0 (6)** Non-credit laboratory to accompany GC 1030. *Coreq:* GC 1030.
- GC 1040 Graphic Communications I 4 (2)**  
Emphasizes basic graphic arts industrial concepts, principles, and practices, with laboratory applications in photography, layout and design, electronic copy preparation, offset lithography, screen printing, flexography, and finishing operations. Covers gravure, letterpress, and specialty printing processes, along with environmental, health, and safety concerns. Includes Honors sections. *Coreq:* GC 1041.
- GC 1041 Graphic Communications I Laboratory 0 (6)** Non-credit laboratory to accompany GC 1040. *Coreq:* GC 1040.
- GC 1990 Creative Inquiry–Graphic Communications I 1-3 (1-3)** Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Freshman standing and consent of faculty member/mentor.
- GC 2070 Graphic Communications II 4 (2)**  
Continuation of GC 1040. Intermediate course for graphic communications and graphic arts specialists which broadens skills and technical knowledge in areas of layout, copy preparation, reproduction photography, film assembly, screen printing, lithographic presswork, and finishing. Includes Honors sections. Students are expected to have computer keyboarding skills of 20 net words per minute. *Preq:* GC 1010 and GC 1020 and GC 1040. *Coreq:* GC 2071.
- GC 2071 Graphic Communications II Laboratory 0 (6)** Non-credit laboratory to accompany GC 2070. *Coreq:* GC 2070.
- GC 2990 Creative Inquiry–Graphic Communications II 1-3 (1-3)** Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Sophomore standing.
- GC 3400 Digital Imaging and eMedia 4 (2)** Course centers around digital camera capture and control, and provides students with experience, techniques and processing options for creating interactive, integrated eMedia. Coursework includes commercial photography, color profiling, digital asset management, personalized cross-media campaigns, Web design and podcasts. *Preq:* GC 1020 and GC 1040. *Coreq:* GC 3401.
- GC 3401 Digital Imaging and eMedia Laboratory 0 (6)** Non-credit laboratory to accompany GC 3400. *Coreq:* GC 3400.
- GC 3500 Graphic Communications Internship I 1 (3)** Full-time supervised employment in an industrial in-plant setting for expansion of experience with materials and processes, production people, and organizations. *Preq:* GC 1040 and Graphic Communications major and consent of instructor. *Preq or concurrent enrollment:* COOP 2010.

**GC 3990 Creative Inquiry—Graphic Communications III** 1-3 (1-3) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of faculty member/mentor.

**GC 4060\* Package and Specialty Printing** 4 (2) In depth study of the problems and processes for printing and converting in package label and specialty printing industries. Flexographic preparation, printing, die making, diecutting, screen printing, container printing, pad printing and bar code production are covered. New developments and trends are discussed. Laboratory in techniques includes printing and converting. Includes Honors sections. *Preq:* GC 3400. *Coreq:* GC 4061.

**GC 4061\* Package and Specialty Printing Laboratory** 0 (6) Non-credit laboratory to accompany GC 4060. *Coreq:* GC 4060.

**GC 4070\* Advanced Flexographic Methods** 4 (2) In-depth study of the methods used in flexographic printing and converting of porous and nonporous substrates. Theory and laboratory applications include setting standards for process color, preparation of plate systems, ink mixing and color matching, testing of films and foils, analysis of recent developments, and prediction of future markets. *Preq:* GC 4060. *Coreq:* GC 4071.

**GC 4071\* Advanced Flexographic Methods Laboratory** 0 (6) Non-credit laboratory to accompany GC 4070. *Coreq:* GC 4070.

**GC 4400\* Commercial Printing** 4 (2) Advances skills learned in previous graphic communications courses and applies the knowledge to large format presses. Students work from the design conception stage through all aspects of preparation, production, and finishing. Emphasizes understanding and incorporating emerging technologies into the production workflow. Includes Honors sections. *Preq:* GC 3400. *Coreq:* GC 4401.

**GC 4401\* Commercial Printing Laboratory** 0 (6) Non-credit laboratory to accompany GC 4400. *Coreq:* GC 4400.

**GC 4440\* Current Developments and Trends in Graphic Communications** 4 (2) Advanced course for Graphic Communications majors. Emphasizes the theory and technical developments that affect process and equipment selection. Topics include color theory and application, electronic color scanning, electronic prepress and communications, gravure color quality control and analysis. Includes Honors sections. *Preq:* GC GC 4060 and GC 4400. *Coreq:* GC 4441.

**GC 4441\* Current Developments and Trends in Graphic Communications Laboratory** 0 (6) Non-credit laboratory to accompany GC 4440. *Coreq:* GC 4440.

**GC 4450\* Advanced Screen Printing Methods** 3 (2) In-depth study of the systems and materials used with the screen printing process. Emphasizes techniques of control and procedures for establishing screen printing methods and standards. *Preq:* GC 2070. *Coreq:* GC 4451.

**GC 4451\* Advanced Screen Printing Methods Laboratory** 0 (3) Non-credit laboratory to accompany GC 4450. *Coreq:* GC 4450.

**GC 4460\* Ink and Substrates** 3 (2) Covers components, manufacturing, process use as well as end use of ink and substrates used in lithography, flexography, gravure, and screen printing. Examines the interrelationship between inks, substrates, and the printing process. Through controlled testing and examination, optimum conditions for improved printability are determined. *Preq:* GC 4060 or GC 4400. *Coreq:* GC 4461.

**GC 4461\* Ink and Substrates Laboratory** 0 (3) Non-credit laboratory to accompany GC 4460. *Coreq:* GC 4460.

**GC 4480\* Planning and Controlling Printing Functions** 3 (2) Study of systems for setting printing production standards, estimating, scheduling, job planning, and the selection of new hardware and technologies. Includes Honors sections. *Preq:* GC 3500 and GC 4060 and GC 4400 and GC 4500. *Coreq:* GC 4481.

**GC 4481\* Planning and Controlling Printing Functions Laboratory** 0 (3) Non-credit laboratory to accompany GC 4480. *Coreq:* GC 4480.

**GC 4500 Graphic Communications Internship II** 1 (3) Continuation of GC 3500. *Preq:* GC 3500; and either GC 4060 or GC 4400. *Preq or concurrent enrollment:* COOP 2020.

**GC 4510 Special Projects in Graphic Communications** 1-6 (1-6) Advanced projects covering theory and/or practices going beyond the scope of regular coursework. Written project approval is required before registering. May be repeated with advisor's approval. Includes Honors sections. *Preq:* Junior standing and completion of three graphic communications courses.

**GC 4550 Advanced Graphic Communications Internship** 1 (3) Full-time employment in an industry directly or indirectly related to printing. Work site and job must be approved in advance. *Preq:* GC 3500 and consent of instructor.

**GC 4800 Senior Seminar in Graphic Communications** 2 (2) Study of current trends and issues in the graphic communications industry. Class centers around group discussions dealing with relevant topics facing the graphic communications manager today. Students draw upon academic experiences, internship experiences, and library research to facilitate discussion. Must be taken during student's last semester on campus. *Preq:* GC 4500.

**GC 4900\* Graphic Communications Selected Topics** 1-3 (1-3) Subjects not covered in other graphic communications courses; organized according to industry trends and student needs. May be repeated for a maximum of 18 credits, but only if different topics are covered. *Preq:* Consent of instructor.

**GC 4990 Creative Inquiry—Graphic Communications IV** 1-3 (1-3) Under the direction of a faculty member, students pursue approved scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Senior standing.

## GENETICS

*Professors:* W. Cao, J. Frugoli, S. Kresovich, H. Luo, W.R. Marcotte, *Chair;* J. Morris, K.S. Smith; *Associate Professors:* F.A. Feltus, A. Lawton-Rauh, H. Liang, K. Paul, M. Sehorn, L.J. Wang; *Assistant Professors:* L.A. Clark, C. Ingram-Smith, L. Kozubowski, M.T. Morris; *Lecturers:* A. Starr-Moss, K. Tsai

**GEN 1030 Careers in Biochemistry and Genetics** 1 (1) Introduction to biochemistry and genetics career paths, professional organizations, ethical issues, and requirements for advanced study. Also gives students training in design of a professional portfolio. Students may not receive credit for both BCHM 1030 and GEN 1030. *Preq:* Biochemistry or Genetics major.

**GEN 3000 Fundamental Genetics** 3 (3) Introductory course covering fundamental principles of genetics in prokaryotes and eukaryotes. Emphasizes Mendelian genetics, physical and chemical basis of heredity, and population genetics. *Preq:* BIOL 1030 or BIOL 1100.

**GEN 3010 Fundamental Genetics Laboratory** 1 (3) Experimental and observational approach addressing the concepts presented in GEN 3000. Inheritance patterns in a wide variety of eukaryotic and prokaryotic organisms are covered. *Preq or concurrent enrollment:* GEN 3000.

**GEN 3020 Molecular and General Genetics** 3 (3) Rapidly-paced course covering Mendelian and molecular genetics, with introductory coverage of quantitative and population genetics. Emphasizes the molecular basis of heredity and gene expression in prokaryotes and eukaryotes and modern genetic technology. Includes Honors sections. *Preq:* BIOL 1100 with C or better.

**GEN 3030 Molecular and General Genetics Laboratory** 2 (4) Laboratory exercises introducing fundamental principles of inheritance in prokaryotes and eukaryotes. *Preq:* BIOL 1100 with C or better. *Preq or concurrent enrollment:* GEN 3020.

**GEN 4050\* Molecular Genetics of Eukaryotes** 3 (3) Molecular genetic analyses of eukaryotes in relation to mutations and repair, complex phenotypes, biochemical pathways, short- and long-term regulation of gene expression, and evolution. May also be offered as BIOL 4050. *Preq:* BCHM 3010 or BCHM 3050; and GEN 3000 and GEN 3020.

**GEN 4100\* Population and Quantitative Genetics** 3 (3) Classical and computational genetics topics, including Mendelian vs. non-Mendelian inheritance, genetic variation, evolutionary, conservation, coalescent theory, molecular evolution, quantitative trait locus, and association mapping in the framework of population and quantitative genetics. Includes Honors sections. *Preq:* STAT 2300 and GEN 3020, each with C or better.

**GEN 4110\* Population and Quantitative Genetics Laboratory** 2 (4) Crosses are performed using eukaryotic organisms with appropriate markers, and molecular markers are amplified, sequenced, and analyzed. Collected data are used to test hypotheses regarding possible modes of inheritance and for patterns of molecular evolution. Population and molecular evolutionary genetics concepts are also examined. *Preq or concurrent enrollment:* GEN 4100.

**GEN 4200\* Molecular Genetics and Gene Regulation** 3 (3) Molecular genetics, including replication, transcription and translation, gene expression, recombinant DNA technology, developmental, human, cancer, and behavioral genetics. Includes Honors sections. *Preq:* BCHM 3010 and GEN 3020, each with C or better.

**GEN 4210 Molecular Genetics and Gene Regulation Laboratory** 2 (4) Explores molecular genetics techniques (transformation, cloning, PCR, gel electrophoresis, Southern Blotting, reporter genes, gene mapping) using prokaryotic and eukaryotic organisms. *Preq or concurrent enrollment:* GEN 4200.

**GEN 4400\* Bioinformatics** 3 (3) Theory and application of computational technology to analysis of the genome, transcriptome, and proteome. Includes Honors sections. May also be offered as BCHM 4400. *Preq:* BCHM 3010 and GEN 3020, each with C or better.

**GEN 4500\* Comparative Genetics** 3 (3) Outlines the genome structure, function, and evolution based on available complete genome sequences. Topics include the evolution of multigene families, origin of eukaryotic organelles, molecular phylogeny, gene duplication, domain shuffling, transposition, and horizontal gene transfer. Includes Honors sections. *Preq:* GEN 4200 with a C or better. *Preq or concurrent enrollment:* GEN 4400.

**GEN 4700\* Human Genetics** 3 (3) Basic principles of inheritance; population, molecular and biochemical genetics; cytogenetics; immunogenetics; complex traits; cancer genetics; treatment of genetic disorders; genetic screening and counseling; and the Human Genome Project. *Preq:* GEN 3000 with a C or better; or GEN 3020 with C or better.

**GEN 4900 Selected Topics in Genetics** 1-4 (1-4) Comprehensive study of selected topics not covered in other courses. May be repeated for a maximum of eight credits, but only if different topics are covered. *Preq:* Consent of instructor.

**GEN 4910 Directed Research in Genetics** 1-8 (3-24) Orientation in genetic research (i.e. experimental planning, execution, and reporting). May be repeated for a maximum of eight credits. Includes Honors sections. *Preq:* Consent of instructor.

**GEN 4930 Senior Seminar** 2 (2) Analysis and discussion of papers from the primary literature in the life sciences particularly in genetics. Students find pertinent articles in the primary literature and present and analyze the selected reading. Includes Honors sections. *Preq:* BCHM 3010 and GEN 3020, each with a C or better; and one of the following with a C or better: GEN 4100 or GEN 4200 or GEN 4500.

**GEN 4950\* Insect Biotechnology** 3 (3) Considers many unique genetic features exhibited by insects and describes the applications of biotechnology to enhance useful products from insects and to affect the control of destructive insects. May also be offered as ENT 4950. *Preq:* ENT 3010 and GEN 3020.

## GEOGRAPHY

*Associate Professor:* C.A. Smith; *Assistant Professor:* W.C. Terry; *Lecturer:* L.F. Howard

**GEOG 1010 Introduction to Geography** 3 (3) Survey of the nature of geography emphasizing the discipline's organizing themes of earth science, relations between people and their environments, interrelations between places, locational analysis, and area studies.

**GEOG 1030 World Regional Geography** 3 (3) Systematic and descriptive survey of the major regions of the world, including their physical and cultural features. Provides a global context for courses in the social sciences and humanities.

**GEOG 1060 Geography of the Physical Environment** 4 (3) Examines the condition of the physical environment, especially the earth's surface and the processes that act on it. Topics range from earth-sun relations to the evolution of landscapes; human habitats and human alteration of the environment. *Coreq:* GEOG 1061.

**GEOG 1061 Geography of the Physical Environment Laboratory** 0 (3) Non-credit laboratory to accompany GEOG 1060. *Coreq:* GEOG 1060.

**GEOG 3010 Political Geography** 3 (3) Geographic basis of states: sovereignty, territory, power within states, relations between states. The geography of international affairs. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3020 Economic Geography** 3 (3) Spatial analysis of economic activity emphasizing regional economics and development. Topics include world population; technology and economic development; principles of spatial interaction; and geography of agriculture, energy manufacturing, and tertiary activities. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3030 Urban Geography** 3 (3) Historical and contemporary survey of the urban world, with particular attention paid to the relationship between people and urban places. Topics include the rise of cities, urban hierarchies, urban land use, and the social geography of cities. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3050 Cultural Geography** 3 (3) Broad examination of the basic cultural variables in the human occupation of the earth using ecological, spatial, regional, and historical approaches. Topics vary but may include cultural areas and distributions, cultural change, cultural landscape, and cultural ecology. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3060 Historical Geography** 3 (3) Exploration of geographical change and the varied patterns of past human activities and people's relationships with the physical environment. Case studies from around the world are used to emphasize key themes in historical geography. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3300 Geography of the Middle East and North Africa** 3 (3) Thematic survey of a world region extending from Morocco to Afghanistan. Emphasizes climate, environment, social geography, historical development of the regional culture of Islam, and common problems facing the area today. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3400 Geography of Latin America** 3 (3) Introduction to the physical, economic, political, and human/cultural geography of Latin America. Special focus is on regional unity and diversity and the historical interaction of man and environment.

**GEOG 3600 Geography of Africa** 3 (3) Study of how tropical, or sub-Saharan, Africa functions in the modern world. Africa's physical environments, peoples and cultures, colonial and post-colonial history, and ideologies of economic development. Five basic themes are covered: population, natural resources, environmental quality, political organization, economic development. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 3990 Creative Inquiry—Geography** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 4010\* Studies in Geography** 3 (3) Intensive study of the geography of a selected world region, such as North America, Europe, or the Middle East, or the geography of a topic, such as the geography of oil or the geography of underdevelopment. May be repeated once for credit with departmental consent. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 4100\* Geography of the American South** 3 (3) Study of the geography of the American South in its changing complexities across almost 400 years of development. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 4200\* Historical Geography of the United States** 3 (3) Survey that places the spatial concepts of geography into a time sequence with special emphasis upon the United States. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 4300\* World Geography of Parks and Equivalent Reserves** 3 (3) Major international patterns in the provision and use of urban and rural parks and recreation are examined. May also be offered as PRTM 4300. *Preq:* 2.0 cumulative grade-point average.

**GEOG 4400\* Geography of Historic Preservation** 3 (3) Aspects of historic preservation emphasizing sites and structures in their geographical, historical, and socioeconomic contexts. Examples are drawn from American architectural styles and settlement forms. *Preq:* GEOG 1010 or GEOG 1030.

**GEOG 4990 Independent Study in Geography** 3 (0) Study of selected topics in geography under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration.

**GEOLOGY**

*Professors:* J.W. Castle, L.C. Murdoch, M.A. Schlautman; *Associate Professors:* S.M. Moysey, B.A. Powell; *Assistant Professor:* L. Shuller-Nickels; *Lecturers:* S. Brame, A. Coulson

**GEOL 1000 Current Topics in Geology 1 (1)**

Lectures and demonstrations covering topics of current interest in the different fields of geology. Recent research developments and career opportunities in the geosciences are emphasized.

**GEOL 1010 Physical Geology 3 (3)**

Study of the minerals and rocks that compose earth's crust, their origins and transformations. Emphasizes geological processes, both internal and external, by which changes are produced on or in the earth. Includes Honors sections.

**GEOL 1030 Physical Geology Laboratory 1 (2)**

Laboratory to accompany GEOL 1010. Provides instruction in the identification of minerals and rocks and in the interpretation of geologic processes through study of topographic maps. Field trips provide direct observation of processes and results. Includes Honors sections. *Prerequisite or concurrent enrollment:* GEOL 1010.

**GEOL 1120 Earth Resources 3 (3)**

Survey of earth's mineral, energy, water, and land resources and environmental and societal impacts associated with the use of these resources.

**GEOL 1140 Earth Resources Laboratory 1 (2)**

Laboratory to accompany GEOL 1120. Provides instruction in the identification of ore and gem minerals and of other earth materials of economic importance. Land and water resources are explored through the use of topographic maps, aerial photographs, remotely sensed images, and field trips.

**GEOL 1200 Natural Hazards 3 (3)**

This class explains the scientific causes of various natural hazards (earthquakes, volcanoes, hurricanes, tsunamis, etc.) Additionally, topics explore how economic, social, and political factors influence our preparedness for and response to disasters. Discussions also examine moral dilemmas resulting from technological limits on our ability to predict and prevent such events.

**GEOL 1250 Sustainable Resource Use 3 (3)**

This course explores the challenges our society faces in making the transition to renewable resource use in a way that is truly sustainable environmentally, economically and socially. The conflicting demands of each system will be examined and used to critically examine possible solutions using a systems based approach. May also be offered as ENSP 1250.

**GEOL 2020 Earth History 4 (3)**

Survey of the earth's geologic history emphasizing how the continents and ocean basins have evolved through geologic time. Evolution of life from the beginning of the fossil record through the present; identification of fossil plants and animals and interpretation of earth's past through study of geologic maps. Field trips illustrate principles. Includes Honors sections. *Prerequisite:* GEOL 1010 and GEOL 1030. *Corequisite:* GEOL 2021.

**GEOL 2021 Earth History Laboratory 0 (3)**

Non-credit laboratory to accompany GEOL 2020. *Corequisite:* GEOL 2020.

**GEOL 2050 Mineralogy and Introductory Petrology 3 (3)**

Includes crystal symmetry and introduction to x-ray crystallography, composition and stability of minerals, survey of common rock-forming minerals, petrological classification of rocks and introduction to rock associations. *Prerequisite:* GEOL 1010 and 1030. *Prerequisite or concurrent enrollment:* CH 1010. *Corequisite:* GEOL 2070.

**GEOL 2070 Mineralogy and Introductory Petrology Laboratory 1 (3)**

Identification of rock-forming minerals and important ore minerals based on their physical properties. Includes hand specimen petrology of igneous, sedimentary, and metamorphic rocks. Credit toward a degree will be given for only one of GEOL 2070 or GEOL 2080. *Corequisite:* GEOL 2050.

**GEOL 2080 Mineralogy and Petrography Laboratory 2 (6)**

Identification of rock-forming minerals and important ore minerals based on their physical and optical properties. Hand specimen petrology and petrography of igneous, sedimentary, and metamorphic rocks. Study of minerals in thin section using polarizing microscope. Credit toward a degree will be given for only one of GEOL 2070 or 2080. *Prerequisite or concurrent enrollment:* GEOL 2050.

**GEOL 2100 Geology of the National Parks 3 (3)**

Survey of selected national parks and monuments emphasizing the dynamic geological processes that have shaped the landscapes of these areas. Special attention is focused on parks exhibiting recent geological activity related to volcanoes, earthquakes, and glaciers. Slides and films are used to highlight specific geological features.

**GEOL 2110 Geoanalysis I 4 (3)**

Students develop a working knowledge of statistical methods used to formulate and solve problems in the earth sciences. Emphasis is on sampling methods and experimental design for geologic settings and on formulating and evaluating hypotheses using statistical inference of data sets. *Prerequisite or concurrent enrollment:* MATH 1080. *Corequisite:* GEOL 2111.

**GEOL 2111 Geoanalysis I Laboratory 0 (3)**

Non-credit laboratory to accompany GEOL 2110. *Corequisite:* GEOL 2110.

**GEOL 2120 Geoanalysis II 4 (3)**

Students develop a working knowledge of deterministic methods used to formulate and solve problems in the earth sciences. Emphasis is on developing conceptual models from geologic field observations, formulating idealized problems, and analyzing and interpreting solutions. Special focus is on using computer software to support analyses. *Prerequisite:* GEOL 2110 and MTHS 1080. *Corequisite:* GEOL 2121.

**GEOL 2121 Geoanalysis II Laboratory 0 (3)**

Non-credit laboratory to accompany GEOL 2120. *Corequisite:* GEOL 2120.

**GEOL 2200 Planetary Science 3 (3)**

Survey of the formation and evolution of planetary bodies. Emphasizes the origin of planetary material and comparative study of the primary processes operative on planetary surfaces. Describes major features of the planets and moons in our solar system, as revealed by recent space missions. May also be offered as ASTR 2200.

**GEOL 2700 Experiences in Sustainable Development: Water 3 (3)**

Integrates cross-disciplinary perspectives on sustainability through active student participation in real-world development projects. Focuses on identifying and overcoming environmental, technical, social/organizational, and economic barriers to the sustainability of water resources. Emphasizes small-scale international water resources development.

**GEOL 2750 Field Methods 3 (1)**

Introduction to geologic field methods, emphasizing traditional and emerging techniques. Students gain competency in using standard mapping tools, making appropriate measurements, mapping geologic formations found in the Piedmont and Blue Ridge, converting field data to digital format, making geologic maps, and presenting their data in accepted formats. *Prerequisite:* GEOL 1010. *Corequisite:* GEOL 2751.

**GEOL 2751 Field Methods Laboratory 0 (4)**

Non-credit laboratory to accompany GEOL 2750. *Corequisite:* GEOL 2750.

**GEOL 2910 Introduction to Research I 1 (1)**

Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research approaches in geology. Social and ethical contexts, communication skills, and professional development are incorporated.

**GEOL 2920 Introduction to Research II 1 (1)**

Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research approaches in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Prerequisite:* GEOL 2910.

**GEOL 3000 Environmental Geology 3 (3)**

Discussion-oriented introduction to relationships of man to his physical surroundings and problems resulting from upsetting the established equilibria of geologic systems; man's role as a geologic agent, environmental conservation and management. Includes Honors sections. *Prerequisite:* GEOL 1010.

**GEOL 3020 Structural Geology 4 (3)**

Diverse geological structures of the earth, their description, origin, and field recognition. Practical problems in interpreting geologic structures are utilized, in addition to theoretical considerations of the mechanics and causes of tectonism. Includes Honors sections. *Prerequisite:* GEOL 2020. *Corequisite:* GEOL 3021.

**GEOL 3021 Structural Geology Laboratory 0 (3)**

Non-credit laboratory to accompany GEOL 3020. *Corequisite:* GEOL 3020.

**GEOL 3130 Sedimentology and Stratigraphy 4 (3)**

Topics include origin, composition, and texture of sediments and sedimentary rocks; sedimentation processes, depositional environments, facies relationships, and diagenesis; introduction to stratigraphic methods and geochronology. Laboratory involves description and classification of hand specimens and thin sections and analytical methods. *Prerequisite:* GEOL 2050. *Corequisite:* GEOL 3131.

**GEOL 3131 Sedimentology and Stratigraphy Laboratory 0 (3)**

Non-credit laboratory to accompany GEOL 3130. *Corequisite:* GEOL 3130.



- GEOL 3140 Sedimentary Petrology 3 (2)** Origin, composition, and texture of sediments and sedimentary rocks, including both siliciclastic and chemical varieties. Interpretation of tectonic settings, depositional systems, facies relationships, and diagenesis. Laboratory involves description and classification of hand specimens and thin sections and analytical methods. Includes Honors sections. *Preq:* GEOL 2050. *Coreq:* GEOL 3141.
- GEOL 3141 Sedimentary Petrology Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 3140. *Coreq:* GEOL 3140.
- GEOL 3160 Igneous and Metamorphic Petrology 3 (2)** Classification, occurrence, and origin of igneous and metamorphic rocks. Discussion of the chemical and physical processes involved in magmatic crystallization and metamorphism. Laboratory study of igneous and metamorphic rocks in hand specimen and thin section. Includes Honors sections. *Preq:* GEOL 2050. *Coreq:* GEOL 3161.
- GEOL 3161 Igneous and Metamorphic Petrology Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 3160. *Coreq:* GEOL 3160.
- GEOL 3180 Introduction to Geochemistry 3 (3)** Introduction to distribution of elements in the core, mantle, and crust of the earth. Control of rock type on trace element content in soils and sediments. Weathering; soil and regolith formation; water-sediment interrelations; solubility, mobility and bioavailability in relation to redox, pH and complexation; biogeochemical cycles of selected elements. *Preq:* GEOL 2050.
- GEOL 3600 Geology and Castles of Scotland 3 (1)** Students spend two weeks in Scotland exploring its diverse geology and visiting medieval castles and ancient stone mountains. Highlights include studying the unconformity at Siccar Point made famous by James Hutton, the father of modern geology; and travelling "The Rock Route" through the Scottish Highlands, where modern ideas about mountain building were birthed. *Coreq:* GEOL 3601.
- GEOL 3601 Geology and Castles of Scotland Laboratory 0 (4)** Non-credit laboratory to accompany GEOL 3600. *Coreq:* GEOL 3600.
- GEOL 3700 Western United States Field Study 3 (1)** Field excursion to a geologic region in the western United States. Students visit sites where the stratigraphy and structure are well exposed, studying a variety of landforms and the geologic processes responsible for their formation. Pre-trip sessions are held on campus. Additional fees are required. May be repeated for a maximum of six credits. *Preq:* GEOL 1010. *Coreq:* GEOL 3701.
- GEOL 3701 Western United States Field Study Laboratory 0 (4)** Non-credit laboratory to accompany GEOL 3700. *Coreq:* GEOL 3700.
- GEOL 3750 Bahamian Field Study 3 (1)** Students develop an understanding of Bahamian geology, culture, and social structure (including the influences of historical context and natural environments). Students stay one week on Andros Island in the Bahamas, traveling by van and boat to various sites. Additional fees are required. Includes Honors sections. *Preq:* GEOL 1010. *Coreq:* GEOL 3751.
- GEOL 3751 Bahamian Field Study Laboratory 0 (4)** Non-credit laboratory to accompany GEOL 3750. *Coreq:* GEOL 3750.
- GEOL 3910 Research Methods I 2 (2)** Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research methods in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Preq or concurrent enrollment:* GEOL 2910.
- GEOL 3920 Research Methods II 2 (2)** Required group learning and research experience for Geology majors (open to others with consent of instructor). Introduction to problem solving through case studies and interdisciplinary team approaches. Focus is on, but not limited to, research methods in geology. Social and ethical contexts, communication skills, and professional development are incorporated. *Preq:* GEOL 3910. *Preq or concurrent enrollment:* GEOL 2910.
- GEOL 4030\* Invertebrate Paleontology 3 (2)** Study of life of past geologic ages as shown by fossilized remains of ancient animals, with emphasis on the invertebrates. *Preq:* GEOL 2020. *Coreq:* GEOL 4031.
- GEOL 4031\* Invertebrate Paleontology Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4030. *Coreq:* GEOL 4030.
- GEOL 4050\* Surficial Geology 4 (3)** Study of surface features of the earth and the processes that produce them. Analysis of landforms including their form, nature, origin, development, and rates and patterns of change. Laboratory studies emphasize terrain analysis and the mechanics of surficial geological processes. *Preq:* GEOL 2020 and GEOL 3000. *Coreq:* GEOL 4051.
- GEOL 4051\* Surficial Geology Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4050. *Coreq:* GEOL 4050.
- GEOL 4090\* Environmental and Exploration Geophysics 4 (3)** Students develop an understanding of the principles and methods used to acquire, analyze, and interpret geophysical data. Emphasis on seismic/radar, gravimetric, and electromagnetic methods. Applications to hydrogeology, environmental engineering and science, soil science, contaminant transport and remediation, near surface geology, geotechnical problems, oil and gas exploration, and carbon sequestration. Includes Honors sections. *Preq:* At least Junior standing. *Coreq:* GEOL 4091.
- GEOL 4091\* Environmental and Exploration Geophysics Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4090. *Coreq:* GEOL 4090.
- GEOL 4110 Research Problems 1-3 (1-3)** Field, laboratory, or library study of an approved topic in geology. Topic would be one not normally covered in formal courses, but may be an extension of a course. Taught either semester. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.
- GEOL 4130 Stratigraphy\* 3 (2)** Analysis of stratified rocks as the repository of earth history and the conceptual framework used to synthesize the world geologic record as a coherent whole. Emphasizes not only traditional lithostratigraphy but also modern seismic stratigraphy, biostratigraphy, magnetostratigraphy, and current stratigraphic issues. *Preq:* GEOL 3140. *Coreq:* GEOL 4131.
- GEOL 4131\* Stratigraphy Laboratory 0 (2)** Non-credit laboratory to accompany GEOL 4130. *Coreq:* GEOL 4130.
- GEOL 4150\* Analysis of Geological Processes 4 (3)** Introduction to methods for analyzing geological processes. Mathematical methods are introduced to solve problems related to stream flow, reaction kinetics, radioactive decay, heat flow, diffusion, fluid flow through geologic media and related processes. *Preq:* MATH 1080. *Coreq:* GEOL 4151.
- GEOL 4151\* Analysis of Geological Processes Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4150. *Coreq:* GEOL 4150.
- GEOL 4210\* GIS Applications in Geology 3 (1)** Introduction to geographic information systems with applications to current geological and hydrological problems. Topics include the use of global positioning systems, spatial analysis, and image analysis. Hands-on training with geographic information systems software and techniques is covered in lab. *Preq:* At least Junior standing. *Coreq:* GEOL 4211.
- GEOL 4211\* GIS Applications in Geology Laboratory 0 (4)** Non-credit laboratory to accompany GEOL 4210. *Coreq:* GEOL 4210.
- GEOL 4510\* Selected Topics in Hydrogeology 1-4 (1-3)** Selected topics in hydrogeology emphasizing new developments in the field. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor. *Coreq:* GEOL 4511.
- GEOL 4511\* Selected Topics in Hydrogeology Laboratory 0 (1-3)** Non-credit laboratory to accompany GEOL 4510. *Coreq:* GEOL 4510.
- GEOL 4590\* Biogeochemistry 3 (3)** Examines how biology directs mass and energy transfer between the lithosphere, biosphere, hydrosphere, and atmosphere. Scale of examination ranges from molecular to global. Topics include element cycling, the mineral-microbe/plant interface, biomineralization, and biogeochemical applications to bioremediation, ecology, environmental toxicology, and biotechnology. *Preq:* GEOL 3180; and CH 2010 or CH 2230.
- GEOL 4750 Summer Geology Field Camp 6 (10)** Introduction to field techniques emphasizing methods applied to hydrogeology. Includes description and mapping of hydrogeologic units and structures using outcrop data and lithologic and geophysical well logs. Also covers construction of potentiometric maps from water level data, performance of pumping tests on mapped aquifers, and analysis of data to determine aquifer characteristics. *Preq:* GEOL 2050 and GEOL 3020.
- GEOL 4820\* Groundwater and Contaminant Transport 3 (3)** Basic principles of groundwater hydrology and transport of contaminants in groundwater systems; groundwater system characteristics; steady and transient flow; well hydraulics, design, and testing; contaminant sources, movement and transformations. May also be offered as CE 4820. *Preq:* Junior standing in the College of Engineering and Science and GEOL 1010.

- GEOL 4850\* Environmental Soil Chemistry 3 (3)** Study of soil chemical processes (sorption, desorption, ion exchange, precipitation, dissolution, and redox reactions) of nutrients and inorganic and organic contaminants in soils and organic matter. Chemical complex equilibria and adsorption phenomena at the solid (soil, sediment, and mineral) water interface are emphasized. May also be offered as ETOX 4850 or PES 4850. *Preq:* CH 2020 or PES 2020.
- GEOL 4910 Research Synthesis I 3 (2)** Required capstone group learning and research experience for Geology majors (open to others with consent of instructor). Involves synthesis of applied geology and other approaches for problem solving through collaborative teams. Course is the culmination of a sequence of case studies incorporating social and ethical contexts, communication skills, and professional development. *Preq:* GEOL 3920. *Coreq:* GEOL 4911.
- GEOL 4911 Research Synthesis I Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4910. *Coreq:* GEOL 4910.
- GEOL 4920 Research Synthesis II 3 (2)** Required capstone group learning and research experience for Geology majors (open to others with consent of instructor). Involves synthesis of applied geology and other approaches for problem solving through collaborative teams. Course is the culmination of a sequence of case studies incorporating social and ethical contexts, communication skills, and professional development. *Preq:* GEOL 4910. *Coreq:* GEOL 4921.
- GEOL 4921 Research Synthesis II Laboratory 0 (3)** Non-credit laboratory to accompany GEOL 4920. *Coreq:* GEOL 4920.
- GERMAN**  
*Professor:* G.J. Love; *Associate Professor:* J. Schmidt; *Assistant Professor:* S. Fredrick; *Lecturers:* L.J. Ferrall, J.T. Littlejohn
- GER 1010 Elementary German 4 (3)** Course for beginners in which, through conversation, composition, and dictation, the fundamentals of the language are taught and a foundation is provided for further study and the eventual ability to read and speak the language. Three hours a week of classroom instruction and one hour a week in the language laboratory. *Coreq:* GER 1011.
- GER 1011 Elementary German Laboratory 0 (1)** Non-credit laboratory to accompany GER 1010. *Coreq:* GER 1010.
- GER 1020 Elementary German 4 (3)** Continuation of GER 1010; three hours a week of classroom instruction and one hour a week in the language laboratory. *Coreq:* GER 1021.
- GER 1021 Elementary German Laboratory 0 (1)** Non-credit laboratory to accompany GER 1020. *Coreq:* GER 1020.
- GER 1040 Basic German 4 (3)** Intensive one-semester program combining GER 1010 and 1020 for students who have previously studied German. Includes fundamentals of grammar and vocabulary as a foundation for written and oral proficiency. *Coreq:* GER 1041.
- GER 1041 Basic German Laboratory 0 (1)** Non-credit laboratory to accompany GER 1040. *Coreq:* GER 1040.
- GER 1510 German for Graduate Students 3 (3)** Intensive program only for graduate students preparing for the reading examination in German. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once for credit. To be taken Pass/No Pass only. *Preq:* Graduate standing.
- GER 2010 Intermediate German 3 (3)** Brief review of GER 1010 and 1020, with conversation, composition, and dictation, and the reading of more serious German prose in short stories and plays. Includes literary and cultural perspectives. Includes Honors sections. *Preq:* GER 1020. *Coreq:* GER 2011.
- GER 2011 Intermediate German Laboratory 0 (1)** Non-credit laboratory to accompany GER 2010. *Coreq:* GER 2010.
- GER 2020 Intermediate German 3 (3)** Emphasizes reading nontechnical German prose more rapidly. Writing, speaking, and listening skills continue to be developed. Includes literary and cultural perspectives. Includes Honors sections. *Preq:* GER 2010. *Coreq:* GER 2021.
- GER 2021 Intermediate German Laboratory 0 (1)** Non-credit laboratory to accompany GER 2020. *Coreq:* GER 2020.
- GER 2600 Selected Topics in German Literature 3 (3)** Study of significant aspects of German literature. Conducted in English.
- GER 2970 Creative Inquiry—German 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.
- GER 2990 Foreign Language Drama Laboratory 1 (3)** Participation in foreign language drama productions. No formal class meetings, but an average of three hours per week in a foreign language drama workshop for production. May be repeated for a maximum of three credits. *Preq:* Consent of instructor directing the play.
- GER 3050 German Conversation and Composition 3 (3)** Training in spoken and written German emphasizing vocabulary acquisition, oral and written communication strategies, appropriate linguistic formulations for specific cultural contexts, and stylistics. *Preq:* GER 2020.
- GER 3060 The German Short Story 3 (3)** Examines the Austrian, German, and Swiss short story as a distinct literary genre that flourished particularly after 1945. Provides ample conversation and composition practice, as well as an introduction to principles of literary prose analysis. *Preq:* GER 2020.
- GER 3100 Summer Immersion Program 6 (6)** Conducted entirely in German for eight hours daily. Program consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of GER 2020. *Preq:* GER 2010.
- GER 3160 German for International Trade I 3 (3)** Spoken and written German common to the German-speaking world of business and industry emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and German cultural patterns in a business setting. *Preq:* GER 2020. *Preq or concurrent enrollment:* GER 3050.
- GER 3400 German Culture 3 (3)** Examines the cultures of German-speaking nations from their origins to the present. Emphasizes the Federal Republic of Germany both before and after the German unification of 1990. *Preq:* GER 2020.
- GER 3600 German Literature to 1832 3 (3)** Examines selected topics in German literature from the Middle Ages to 1832. Readings may include works by Lessing, Goethe, Schiller, and the Romantics. *Preq or concurrent enrollment:* GER 3050 or GER 3060.
- GER 3610 German Literature from 1832 to Modernism 3 (3)** Examines drama, poetry, and prose from the Biedermeier period through naturalism and realism to the advent of modernism. *Preq:* GER 3050 or GER 3060.
- GER 3690 Special Topics in German Literature 3 (3)** Study of a significant aspect of German literature. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* GER 3050 or GER 3060.
- GER 3970 Creative Inquiry—German 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- GER 3980 Directed Reading 1-3 (1-3)** Directed study of selected topics in German literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- GER 4050 Advanced Contemporary German Language 3 (3)** Advanced study of spoken and written contemporary German based on modern autobiographical texts, eyewitness accounts of recent historical events, and media coverage of current events. Employs Internet, print and audio texts, TV programs, and photo series. *Preq:* One 3000-level German course.
- GER 4160 German for International Trade II 3 (3)** Study of language and cultural environment of the German-speaking markets of the world, including linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* GER 3160.
- GER 4170 Topics in German for International Trade 3 (3)** Examination and analysis of selected topics related to the business culture and economy of Germany, Austria, Switzerland, the European Union, or the European Free Trade Association. Topics may include the reconstruction of Eastern Germany's economy, the expansion of the European Union, or current events of economic importance. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* One 3000-level German course.

**GER 4500 Advanced Studies in German Drama** 3 (3) Extensive study of a major theme or aspect of German drama. May include recorded live performances, stage design, theatre architecture, and the music and art of the theatre. *Preq:* GER 3050 or GER 3060.

**GER 4550 German Film** 3 (2) Overview of German cinema including the expressionist classics of the Weimar Republic, entertainment and documentary movies of the Nazi era, classics of the postwar New German Wave (West Germany), distinctive East German films, and vanguard contemporary films. *Preq:* GER 3050 or GER 3060. *Coreq:* GER 4551.

**GER 4551 German Film Laboratory** 0 (3) Non-credit laboratory to accompany GER 4550. *Coreq:* GER 4550.

**GER 4600 Modernism in German Literature** 3 (3) Study of major works of German literature and culture in the modernist era (1888–1933). May include drama, music, philosophy, and the plastic arts. *Preq:* GER 3050 or GER 3060.

**GER 4610 German Literature Since 1933** 3 (3) Study of selected authors, texts, or genres in contemporary German literature. *Preq:* GER 3050 or GER 3060.

**GER 4750 Advanced German Seminar** 3 (3) Concentrated research and discussion on advanced topics, works, or texts in German literature, film, art, drama, music, or philosophy. Conducted in German. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* One 4000-level German course.

**GER 4760 Advanced Seminar in German Thought** 3 (3) Concentrated research and discussion on advanced topics, works or texts in German literature, film, art, drama, music or philosophy. Conducted in English. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing.

**GER 4970 Creative Inquiry—German** 1-4 (1-4) Continuation of research initiated in GER 3970. Students complete their project and disseminate their research results. *Preq:* GER 3970.

**GER 4980\* Independent Study** 1-3 (1-3) Supervised study of selected topics in German literature, language, or culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

## GREAT WORKS

**GW 3010 Great Books of the Western World** 3 (3) Introduces Great Works minor. Includes readings about the Great Books concept, as well as various great books from the humanities, arts and natural and social sciences. Includes Honors sections. May also be offered as ENGL 3010. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.

**GW 4020 Great Works of Science** 3 (3) Understanding of science in terms of its history and its approach to problem-solving through study of selected great works. Emphasis is on developing students' abilities to reflect on the problems and methodologies encountered in the scientific method. Includes Honors sections.

**GW 4030 Special Topics in Continental Literature** 3 (3) Important primary texts written in modern European languages are taught in English. Content varies according to instructor. Includes Honors sections. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.

**GW 4050 The Darwinian Revolution** 3 (3) Examination of Charles Darwin's *The Origin of Species* and its cultural impact from his time to ours. Topics include the contemporaneous reception of Darwin's work, the Scopes Monkey Trial, and more recent controversies over Creationism and Intelligent Design. Includes Honors sections. *Preq:* ENGL 2020 or ENGL 2120 or ENGL 2130 or ENGL 2140 or ENGL 2150.

## HEALTH CARE GENETICS

**HCG 3330 Health Care Genetics** 3 (3) Focuses on the new genetics and the implications for health care professionals. Discussion includes applications of the evolving genetics technology and services to changing life stages. Issues of ethics relevant to various genetic disorders is also addressed. May also be offered as NURS 3330. *Preq:* BIOL 2220.

## HEALTH, EDUCATION AND HUMAN DEVELOPMENT

**HEHD 1990 Creative Inquiry I** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue a first phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**HEHD 2990 Creative Inquiry II** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue a second phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Sophomore standing and consent of instructor.

**HEHD 3990 Creative Inquiry III** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue a third phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing and consent of instructor.

**HEHD 4000\* Introduction to Leadership Theories and Concepts** 3 (2) Interdisciplinary course introduces students to the nature of leadership. Students gain a broad understanding of the history and origins of leadership, theoretical approaches to leadership, and the essence of contemporary leadership. Students are encouraged to test their ability to apply these concepts to life experiences. *Preq:* Junior standing. *Coreq:* HEHD 4001.

**HEHD 4001\* Introduction to Leadership Theories and Concepts Laboratory** 0 (1) Non-credit laboratory to accompany HEHD 4000. *Coreq:* HEHD 4000.

**HEHD 4100\* Leadership Behavior and Civic Engagement** 3 (2) Students couple concepts of social justice and civic engagement with theoretical foundations from HEHD 4000 to complete a comprehensive theory to practice project. Students are introduced to a comprehensive leadership skill set to become active change agents for the common good. *Preq:* HEHD 4000. *Coreq:* HEHD 4101.

**HEHD 4101\* Leadership Behavior and Civic Engagement Laboratory** 0 (1) Non-credit laboratory to accompany HEHD 4100. *Coreq:* HEHD 4100.

**HEHD 4200\* Leadership Application and Experience** 3 (2) Students are immersed in a practical leadership experience utilizing knowledge and skills gained in HEHD 4000 and 4100. Students identify an issue or problem and practice leadership by developing and implementing a community project. Students are challenged to commit themselves to long-term engagement as agents of change. *Preq:* HEHD 4100. *Coreq:* HEHD 4201.

**HEHD 4201\* Leadership Application and Experience Laboratory** 0 (3) Non-credit laboratory to accompany HEHD 4200. *Coreq:* HEHD 4200.

**HEHD 4990 Creative Inquiry IV** 1-3 (1-3) In consultation with and under the direction of a faculty member, students pursue a fourth phase of scholarly activities in teams. These creative inquiry projects may be discipline-specific or interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Senior standing and consent of instructor.

## HISTORY

*Professors:* J.R. Andrew Jr., S.L. Barczewski, J.M. Burns, E.D. Carney, H.R. Grant, T.J. Kuehn, Chair; S.G. Marks, E.E. Moise, R.L. Saunders, Jr, M.N. Taylor-Shockley; *Associate Professors:* A.A. Bartley, A. Bein, P.C. Anderson, C. Dunn, C.A. Grubb, P.E. Mack, R.A. Moore, M.S. Silvestri; *Assistant Professors:* M.L. Meng, M. Morey, L. B. Wilson; *Lecturers:* J.B. Jeffries, E.K. Wood

**HIST 1000 Higher Education and Clemson** 1 (1) Introduction to higher education, its background and development in the western world, emphasizing land-grant institutions and Clemson University in particular.

**HIST 1010 History of the United States** 3 (3) Political, economic, and social development of the American people from the period of discovery to the end of Reconstruction. Includes Honors sections.

**HIST 1020 History of the United States** 3 (3) Political, economic, and social development of the American people from the end of Reconstruction to the present. Includes Honors sections.

**HIST 1220 History, Technology, and Society** 3 (3) Topics in the history of technology with emphasis on how technology affects society and how society shapes technology. Emphasis is on 19th and 20th century America, but some material from other periods of Western Civilization and other world regions may be discussed. Includes Honors sections.

- HIST 1240 Environmental History Survey 3 (3)**  
Introduction to environmental history, in the United States and globally, with emphasis on changing attitudes toward the environment and the interaction between science and public policy. Includes Honors sections.
- HIST 1720 The West and the World I 3 (3)**  
Examines the history of the West from early times until 1648. After a comparative evaluation of the emergence of civilization around the globe, course concentrates on the history of the peoples of Europe up to the age of European exploration and overseas expansion. Includes Honors sections.
- HIST 1730 The West and the World II 3 (3)**  
Surveys the history of the West in modern times, from the late 17th century to the present. Particular emphasis is placed on Europe's interaction with non-western societies. Through cross-cultural comparisons, European history is placed in global context. Includes Honors sections.
- HIST 1930 Modern World History 3 (3)**  
Political, economic, social, and cultural history of the modern world from the 19th century to the present.
- HIST 1980 Current History 1 (1)**  
Examination of major events and problem areas in the news emphasizing their historical context and possible long-range significance. May be repeated for a maximum of three credits. Does not count toward the requirements of the major or minor in History.
- HIST 2000 Fort Hill Internship 1-3 (1-3)**  
Provides practical experience in public history museum work and/or historical preservation in the setting of Fort Hill. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Consent of internship director.
- HIST 2010 Prelaw Internship 1-3 (1-3)**  
Faculty-supervised internship in a law firm or other legal setting. Introduces students to the workings of the legal system. To be taken Pass/No Pass only. *Preq:* History major and sophomore standing.
- HIST 2020 Internship 1-3 (1-3)**  
Exposes History majors to hands-on experience in research, analysis, and public presentation of historical scholarship. May include working with faculty on research projects, in museums or historical organizations, or at sites. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Sophomore standing.
- HIST 2890 Creative Inquiry—History 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits. *Preq:* Consent of faculty member/mentor.
- HIST 2990 Seminar: The Historians Craft 4 (3)**  
Writing and speaking intensive course to introduce History majors to study of what history is and what a historian does, including historiography, research techniques, ethics of the historical profession, and forms of presentation. *Preq:* History major. *Coreq:* HIST 2991.
- HIST 2991 Seminar: The Historians Craft Laboratory 0 (2)**  
Non-credit laboratory to accompany HIST 2990. *Coreq:* HIST 2990.
- HIST 3000 History of Colonial America 3 (3)**  
Development of American institutions and customs in the period before 1776. Considerable emphasis is placed on the imperial relations between Great Britain and her colonies and upon the movement towards and the philosophy of the American Revolution.
- HIST 3010 American Revolution and the New Nation 3 (3)**  
Study of the various historical explanations leading to an understanding of the American Revolution, the establishment of the nation under the Constitution, and the first decade of the new nation. Special emphasis is on developing an understanding of individual motivation and ideological development present during the last four decades of the 18th century.
- HIST 3020 Age of Jefferson, Jackson, and Calhoun 3 (3)**  
Formation and growing pains of the new nation through the Federal and Middle periods of its history emphasizing economic and political development, the westward movement, and the conflicting forces of nationalism and sectionalism.
- HIST 3030 Civil War and Reconstruction 3 (3)**  
Study of the political, military, and social aspects of the sectional conflict and of the era of Reconstruction. Some emphasis is placed on the historical controversies inspired by the period.
- HIST 3040 Industrialism and the Progressive Era 3 (3)**  
Study of American society in the period between the 1880s and 1930s. Emphasizes the effects of industrialization and urbanization on the American people.
- HIST 3050 The United States in the Jazz Age, Depression, and War: 1918–1945 3 (3)**  
Starting at Armistice Day, 1918, course analyzes the dawn of the age of mass consumption and mass communication, the Crash of 1929, Franklin Roosevelt and the New Deal, the gathering war clouds in Europe and Asia, and the Great Crusade of World War II. *Preq:* Sophomore standing.
- HIST 3060 The United States in the Postwar World: 1945–1975 3 (3)**  
Examination of the American experience from the end of World War II through the period of the Korean and Vietnam wars, the Cold War, the Civil Rights movement, the counter-culture of the 1960s, assassinations, and Watergate.
- HIST 3080 The United States in the Age of Reagan and Clinton: 1975–Present 3 (3)**  
The United States and the world in the recent era of economic and political upheaval, the end of the Cold War, the rise of the global economy and terrorism, social and cultural change, and deepening political and social divisions. *Preq:* Sophomore standing.
- HIST 3100 History of Religion in the United States 3 (3)**  
Development of religion in the U.S. from the Colonial period to the 20th century. Attention is devoted to analyzing the broad currents in religious movements and religious thought that have given shape to the American pluralistic experience. May also be offered as REL 3100.
- HIST 3110 African American History to 1877 3 (3)**  
Study of the African-American experience in the United States from the African past through slavery to 1877.
- HIST 3120 African American History from 1877 to the Present 3 (3)**  
Study of African American experience in the United States from 1877 to the present.
- HIST 3130 History of South Carolina 3 (3)**  
Political, economic, and social development of South Carolina from 1670 to the present. Includes Honors sections.
- HIST 3140 History of the South to 1865 3 (3)**  
Origins and development of political, social, economic, and cultural institutions of the South from the Colonial period to the end of the Civil War and the role of the South in the nation's development.
- HIST 3160 American Social History 3 (3)**  
Study of American society, including the relationship among classes, ethnic groups, regions, and sexes, from the Colonial period to the present.
- HIST 3180 History of American Women 3 (3)**  
Survey course of the history of American women emphasizing the changing role of women in American culture and society.
- HIST 3190 Gender and Law in United States History 3 (3)**  
Survey of how law has reflected and created distinctions on the basis of gender and sexuality throughout United States history. Emphasizes the relationship between legal rules and social conditions and the way in which groups have challenged these legal categories over time.
- HIST 3200 History of United States Public Education 3 (3)**  
Historical survey of the development of United States public schools. May also be offered as EDF 3200. *Preq or concurrent enrollment:* ED 1050 and a 2.0 minimum grade-point average.
- HIST 3210 History of Science 3 (3)**  
Survey of the development of science in the Western world, emphasizing the period from the Renaissance to the present.
- HIST 3220 History of Technology 3 (3)**  
History of the major developments in Western technology and their relationships to the societies and cultures in which they flourished.
- HIST 3230 History of American Technology 3 (3)**  
History of developments in technology and their role in American life with particular emphasis on the American Industrial Revolution and the 20th century.
- HIST 3240 History of the South, 1865 to the Present 3 (3)**  
Development of political, social, and cultural institutions of the South from the end of the Civil War to the present and the South's relationship to the rest of the nation.
- HIST 3250 American Economic Development 3 (3)**  
Economic development of the United States from Colonial to recent times, emphasizing the institutional development of agriculture, banking, business and labor, and government regulations and policy.
- HIST 3260 History of American Transportation 3 (3)**  
Examines the principal forms of transportation in the United States from colonial times to the present, including water, road, canal, railroad, internal combustion, and air. Emphasizes technological developments and economic, geographic, and social impact of specific transport forms.
- HIST 3270 American Business History 3 (3)**  
Survey of the history of American business using a case-study approach. Focuses on the effects that policies and institutions have on individual businesses.

- HIST 3280 United States Legal History to 1890** 3 (3) Survey of the American legal system in its historical perspective from Colonial times to 1890. Emphasizes the relationship between law and society, the way in which the practice of law changed American society, and the way in which social development affected both the theory and practice of the law.
- HIST 3290 United States Legal History Since 1890** 3 (3) Examination of the social, cultural, intellectual, economic, and political forces that have helped shape the law in the U.S. since 1890.
- HIST 3300 History of Modern China** 3 (3) Growth and development of Chinese civilization from ancient times to the present. Emphasis is on 20th century China, particularly since the rise to power of the Communist regime.
- HIST 3330 History of Modern Japan** 3 (3) Origin and development of Japanese civilization with particular emphasis on modern Japan from mid-19th century to the present.
- HIST 3340 Premodern East Asia** 3 (3) Introduction to histories of China and Japan, from antiquity to approximately 1850. Political, religious, artistic, and other aspects of premodern society are examined and compared in order to gain significant insights regarding the premodern antecedents of these two dynamic and important nations.
- HIST 3370 History of South Africa** 3 (3) Examines the important trends in the history of South Africa from earliest times to the present. Topics include nature of precolonial society, European immigration, rise of industrial capitalism, advent of Apartheid, and the liberation struggle.
- HIST 3380 African History to 1875** 3 (3) Study of sub-Saharan Africa from antiquity to European colonial rule, exploring the development of Stone Age cultures; agricultural and pastoral societies; ancient civilizations; political, economic, and social systems; gradual shift of initiative from the interior to the coast; and various slave trades.
- HIST 3390 Modern Africa, 1875 to the Present** 3 (3) Study of sub-Saharan Africa from 1875 to the present, with focus on the development and decline of European imperialism, dilemmas of African independence, and ethnic struggles in Southern Africa.
- HIST 3400 Latin America: From Conquest to Independence** 3 (3) Examination of the encounters, collaborations, and clashes that characterized the conquest period and beyond in Latin America. Readings are assigned regarding the spiritual, biological, social, and political consequences of the meeting of Indians, Africans, and Europeans. Historical sources include images, artwork, letters, and memoirs.
- HIST 3410 Modern Mexico** 3 (3) Introduction to the geography of the region; origins and progress of the Independence movements; political, economic, and social developments after 1825; and current domestic and international problems.
- HIST 3420 South America Since 1800** 3 (3) Introduction to the geography of the region; origins and progress of the Independence movements; political, economic, and social developments after 1825; and current domestic and international problems.
- HIST 3510 Ancient Near East** 3 (3) History of the peoples and civilizations of the Near East from the Sumerians to the establishment of Roman power in this region. Includes geography, mythology, religious, and economic currents as well as the methods and discoveries of archaeology. May also be offered as REL 3510.
- HIST 3520 Egypt in the Days of the Pharaohs** 3 (3) Egyptian civilization from its beginning until the period of Roman conquest. Includes a survey of political history but also deals with daily life, making much use of archaeological evidence.
- HIST 3530 Women in Antiquity** 3 (3) Focuses on women in the ancient period in Mesopotamia, Israel, Egypt, Greece, Rome, and in the early Christian Church. Formation of gender roles and issues related to ancient sexuality also receive attention.
- HIST 3540 The Greek World** 3 (3) Study of Greek civilization from its beginning until the time of the Roman conquest, concentrating on the social institutions of the Greek city-states.
- HIST 3550 The Roman World** 3 (3) Considers the rise of Rome to world empire and the international civilization it dominated. Concentrates on the nature of the political change from Republic to monarchy with particular emphasis on city life and the causes of its decline.
- HIST 3610 History of Britain to 1688** 3 (3) Study of historical developments in the British Isles through the 17th century. Focus is on political institutions, warfare, social and economic trends, and cultural and legal developments.
- HIST 3630 Britain Since 1688** 3 (3) Study of political, cultural, social, economic, and imperial issues in the history of the British Isles from the late 17th century to the present. Includes Honors sections.
- HIST 3650 British Cultural History** 3 (3) Examination of topics in British cultural history from the 17th century to the present. Emphasizes the 19th and 20th centuries.
- HIST 3670 Modern Irish History** 3 (3) Examines Irish history over the past four centuries, with particular attention to the 19th and 20th centuries. Irish political, social, economic, and cultural history, Anglo-Irish relations, and the Irish diaspora are considered.
- HIST 3700 Medieval History** 3 (3) Survey of the period from the eclipse of Rome to the advent of the Renaissance, emphasizing human migrations, feudalism, rise of towns, and cultural life.
- HIST 3720 The Renaissance** 3 (3) Examination of the transitional period of European civilization (ca. 1300–1500) emphasizing institutional, cultural, and intellectual developments.
- HIST 3730 Age of the Protestant Reformation** 3 (3) Evolution of Modern Europe (ca. 1500–1660), as affected by the Reformation, wars of religion, and growth of nation-states. Study includes intellectual advances and the beginnings of European expansion overseas. May also be offered as REL 3730.
- HIST 3740 Europe in the Age of Reason** 3 (3) Study of the quest for order and the consolidation of the European state system between 1660 and 1789 with emphasis on the idea of absolutism, the question of French hegemony, and the synthesis of the 18th-century Enlightenment.
- HIST 3750 Revolutionary Europe** 3 (3) History of Europe from the outbreak of the French Revolution through the Revolutions of 1848 emphasizing the conflict between the forces of change and those of conservatism, within the states and in Europe in general.
- HIST 3770 Europe, 1914–1945** 3 (3) Focuses on Europe during two major wars and the peacetime adjustments Europeans made, or failed to make, during the twenty-year interim between those wars.
- HIST 3780 Europe Since 1945** 3 (3) Focuses on how World War II completed the destruction of European global hegemony, creating a bipolar continent with the west dominated by the United States and the east by Soviet Russia, and how Europe adjusted to this situation.
- HIST 3800 Imperial Germany** 3 (3) German history from the beginning of the German Empire, 1870–71, through World War I. Emphasizes the influence of militarism, nationalism, anti-Semitism, and xenophobia on the German culture and political process.
- HIST 3810 Germany Since 1918** 3 (3) German history from the time of Germany's defeat in World War I, through the Nazi period and World War II. Culminates with the study of a divided Germany.
- HIST 3840 History of Modern France** 3 (3) French history from mid-19th century to the present with particular emphasis on France since 1900.
- HIST 3850 History of Imperial Russia** 3 (3) Survey of the formative years of the Russian Empire from the time of accession of Peter the Great to the time of the Russian Revolution. Social, political, diplomatic, and intellectual developments are given equal treatment.
- HIST 3860 History of the Soviet Union** 3 (3) Soviet history from the revolution to 1991. Surveys the creation and subsequent development of the communist political and social system, with attention given to culture and diplomacy.
- HIST 3870 The Russian Revolution** 3 (3) History of one of the most formative series of events of the 20th century. Follows the crisis of Imperial Russia, its downfall during World War I, and subsequent revolutionary upheaval leading to the formation of the USSR.
- HIST 3890 Creative Inquiry—History** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of nine credits. *Prq:* Consent of faculty member/mentor.
- HIST 3900 Modern Military History** 3 (3) Survey of the development of modern warfare and the influence of technological change on warfare. Particular attention is given to the major conflicts of the 20th and 21st centuries.
- HIST 3910 Post World War II World** 3 (3) Examines the world in the age of the Cold War; the breakdown of the colonial empires; and racial, religious, ethnic, national, and social tensions. The United States provides the central core to the class.

- HIST 3920 History of the Environment of the United States** 3 (3) Examination of the historical development of the attitudes, institutions, laws, people, and consequences that have affected the environment of the United States from pre-Columbian days until the present. Emphasizes the interaction of human beings within and with the environment.
- HIST 3930 Sports in the Modern World** 3 (3) Analysis of the global evolution and diffusion of sports in the industrial age emphasizing the linkage of sports structure and performance to the larger social context.
- HIST 3940 Non-Western History** 3 (3) Examines the important trends in world history since 1500—including capitalism, industrialization, nationalism, migration, and imperialism—with a focus on non-Western regions. *Preq:* HIST 1730.
- HIST 3950 Civil Rights History** 3 (3) Examines the development of American civil rights from the creation of the Constitution through the present. Emphasis is on the legal struggle of African Americans for civil rights, but how other groups fought for rights in the courts is also considered.
- HIST 3960 The Middle East to 1800** 3 (3) Examines the histories, cultures, and societies of the Middle East from the rise of Islam in the seventh century to the eve of European colonial penetration.
- HIST 3970 Modern Middle East** 3 (3) Examines the histories, cultures, and societies of the Middle East from the 18th century to the present day with particular emphasis on contemporary issues.
- HIST 4000\* Studies in United States History** 3 (3) Topics and problems in the history of the United States from the Colonial era to the present. May be repeated once for credit with departmental consent.
- HIST 4090 Kennedy Assassination and Watergate** 3 (3) Journey into the underbelly that examines the diverse elements of national security, divisive politics, the Cold War and Cuba, FBI, CIA, the mob, fanaticism, anomie, and threats to the stability of the republic that seem to have come together in Dallas in 1963 and in Watergate. *Preq:* Junior standing.
- HIST 4140 Introduction to the Study of History Museums** 3 (3) An Introduction to the field of museology, covering the history, philosophy, and ethics of the profession; various types of museums, and different aspects of museum work; the museum's role in the community; and the effects of philanthropy and government on museums. *Preq:* Any 3000-level history course.
- HIST 4150\* Introduction to Digital History** 3 (3) Introduces students to the philosophy and practice of the emerging field of History and New Media with a particular focus on how public historians can use technology to enhance their archival/museum/center's visibility with the general public. *Preq:* Any 3000-level history course.
- HIST 4170\* History and Tourism** 3 (3) Introduces students to important scholarship in the heritage tourism field. Examines the origins and objectives of heritage tourism, and case studies of how professionals employ heritage tourism. *Preq:* Any 3000-level history course.
- HIST 4180\* Oral History and Local History** 3 (3) Introduces students to the most recent work in oral history and methodology with a focus on the history of the Upstate and Appalachia from the colonial era to the present. Students engage in their own local oral history project and produce a research paper based on their findings. *Preq:* Any 3000-level history course.
- HIST 4200\* History and Film** 3 (2) Analyzes the role of the cinema in the construction and dissemination of history. May be repeated once for credit with departmental consent. *Coreq:* HIST 4201.
- HIST 4201\* History and Film Laboratory** 0 (3) Non-credit laboratory to accompany HIST 4200. *Coreq:* HIST 4200.
- HIST 4240\* Topics in History of Medicine and Health** 3 (3) Selected topics in the development of medicine and health care including public attitudes towards health and medicine.
- HIST 4360\* The Vietnam Wars** 3 (3) Wars in Vietnam are seen in two phases. The First Indochina War, 1946–54, is covered briefly. Main body of the course covers the Second Indochina War, which began as a guerrilla conflict in 1959–60 and ended as a mostly conventional war in the Communist victory of 1975.
- HIST 4380\* Problems in African Historiography and Methodology** 3 (3) Concentrates on major issues in the field of African history with an additional focus on methodological concerns. May be repeated once for credit with departmental consent.
- HIST 4400\* Studies in Latin American History** 3 (3) Consideration of selected and varied topics in Latin American history through readings, discussions, and individual or group projects. Special attention is given to the use of an inquiry or problem-solving method of historical analysis and to the cultivation of a comparative perspective. May be repeated once for credit with departmental consent.
- HIST 4500\* Studies in Ancient History** 3 (3) Selected topics in ancient history ranging from pre-Biblical times to the fall of the Roman Empire. May be repeated once for credit with departmental consent.
- HIST 4510\* Alexander the Great** 3 (3) Focuses on the career of Alexander the Great and deals with the history and archaeology of ancient Macedonia.
- HIST 4520\* History of Early Christianity** 3 (3) Study of the history, social and doctrinal, of early Christianity up to 600 A.D. May also be offered as REL 4520.
- HIST 4600\* Studies in British History** 3 (3) Examination of selected themes, topics, or periods in British history from Anglo-Saxon times to the present. May be repeated once for credit with departmental consent. Includes Honors sections.
- HIST 4700\* Studies in Early European History** 3 (3) Study of selected topics or themes in European history from the fall of the Roman Empire to the age of industrialization. May be repeated once for credit with departmental consent.
- HIST 4710\* Studies in Modern European History** 3 (3) Study of selected topics or problems in European history from the end of the Old Regime to the present. May be repeated once for credit with departmental consent. Includes Honors sections.
- HIST 4720\* Medieval Conquests and Crusades** 3 (3) Focuses on medieval conquests with particular emphasis on the era of the crusades. Investigates the origins and historical significance of the crusades from both Christian and Muslim perspectives, and examines crusader societies at home and abroad. Explores other medieval colonization movements and religious justifications for warfare outside the Holy Land.
- HIST 4800 Museum Practicum** 3 (3) Introduces critical issues and museum theoretical perspectives affecting museum curators and other museum professionals. Students will integrate theory with practical experience in public history realm as they work with museum professionals. *Preq:* HIST 4140.
- HIST 4870\* World War II and the World** 3 (3) World War II was a cataclysm of the twentieth century that touched every part of the globe and ushered in the atomic age. This course examines the war from its origins in the aftermath of World War I to the war crimes trials and the dawn of the Cold War.
- HIST 4900 Senior Seminar** 3 (3) Seminar in current research themes in history. Students conduct directed research on a particular topic and learn research, writing, and oral presentation techniques. Seminar topics vary from section to section and from semester to semester. *Preq:* History major and Senior standing and HIST 2990 with a C or better.
- HIST 4910\* Studies in the History of Science and Technology** 3 (3) Selected topics in the development of science and technology emphasizing their social, political, and economic effects. May be repeated once for credit with departmental consent. Includes Honors sections.
- HIST 4920\* Studies in Diplomatic History** 3 (3) Selected topics and problems in international conflict and conflict resolution among nations. Concentration is usually in 20th century history. May be repeated once for credit with departmental consent.
- HIST 4930\* Studies in Social History** 3 (3) Studies in the ways people have earned their livings and lived their lives, individually and as communities, in the confines of different societies. May be repeated once for credit with departmental consent.
- HIST 4940\* Studies in Comparative History** 3 (3) Selected topics in comparative history, contrasting and comparing similar historic developments in different nations, geographic areas, or civilizations. May be repeated once for credit with departmental consent.
- HIST 4950\* Studies in the History of Ideas** 3 (3) Selected topics and themes in the development of ideas that have had an impact on the behavior of individuals and civilizations. May be repeated once for credit with departmental consent.
- HIST 4960\* Studies in Legal History** 3 (3) Study of selected problems in the development of law and the system of criminal and civil justice. May be repeated once for credit with departmental consent.
- HIST 4970 Senior Honors Research** 3 (3) Research for the preparation of senior honors thesis. May be repeated once for credit with departmental consent. May be repeated once for credit with departmental consent. *Preq:* Senior standing, completion of a 4000-level history course, approval of the History Department.

**HIST 4980 Senior Honors Thesis 3 (3)** Writing of the senior honors thesis. May be repeated once for credit with departmental consent. *Preq:* HIST 4970.

**HIST 4990 Independent Study 1-3 (1-3)** Study of selected problems in history under the direction of a faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration. May be repeated once for credit with departmental consent. *Preq:* Consent of department chair.

## HEALTH

*Professors:* L.A. Crandall, *Chair;* C.J. Dye, D.B. Jackson, J.B. Kingree, R.M. Mayo, W.W. Sherrill, H.D. Spitler; *Research Professor:* M.P. Thompson; *Associate Professors:* S.F. Griffin, K.A. Kemper, J.E. Williams; *Assistant Professors:* L. Shi, K.D. Truong; *Senior Lecturers:* D.A. Falta, K.M. Meyer, *Lecturer:* R.S. Welsh; *Adjunct Faculty:* G.L. Adams, B.F. Campbell, V.S. Gallicchio, M.J. Hudson, W.J. Jones, J.T. Kirby, B.A. Lessey, W.C. Logan, J.A. McCubbin, M.C. Riordan, S. Verderber, J.G. Wong; *Adjunct Lecturers:* D.M. Charles, E.J. Walker

**HLTH 2020 Introduction to Public Health 3 (3)** Examination of the forces that have influenced current health delivery systems, health practices, and trends. General systems theory is introduced. Health majors are given enrollment priority.

**HLTH 2030 Overview of Health Care Systems 3 (3)** Introduction to the health care delivery system including public health and health care components. Examines and discusses individual and public expectations of need and demand for health care and delivery of public health and health care services.

**HLTH 2400 Determinants of Health Behavior 3 (3)** Analysis of health behaviors based on psychological, social, cultural, and environmental factors. Introduces health behavior theories. *Preq:* HLTH 2020 or HLTH 2980 and Health Science major.

**HLTH 2500 Health and Fitness 3 (3)** Study of interrelationship between health and fitness. Emphasizes the cardiovascular system and benefits of exercise.

**HLTH 2980 Human Health and Disease 3 (3)** Study of good health practices emphasizing lifestyles and measures of health. Health majors are given enrollment priority.

**HLTH 3030 Public Health Communication 3 (3)** Introduction to the use of health and communication theory and social marketing strategies to create effective, evidence-based, culturally appropriate health communication messages and campaigns. *Preq:* HLTH 2400 and HLTH 2980.

**HLTH 3050 Body Response to Health Behaviors 3 (3)** Positive benefits and the negative impact of certain behaviors at cellular, organ, and body-system levels are examined. The pathways of selected injury and disease are explored. Expected physiological changes are applied in identifying strategies for promoting health in the presence (or absence) of disease. Health majors are given enrollment priority. *Preq or concurrent enrollment:* BIOL 2230.

**HLTH 3100 Women's Health Issues 3 (3)** Exploration of specific health needs of women, with emphasis on understanding and preventing problems of women's health. Health majors are given enrollment priority. *Preq:* Junior standing.

**HLTH 3150 Social Epidemiology 3 (3)** Exploration of the current problems and issues associated with the health of population groups. The interrelationships of biological, sociocultural, behavioral, environmental, political, and economic risk factors and the health and illness patterns of those in population groups are examined. *Preq:* HLTH 2980 and HLTH 3800.

**HLTH 3200 Health Maintenance for Men 3 (3)** Exploration of specific health maintenance needs of men, with emphasis on understanding and preventing problems of men's health. Health majors are given enrollment priority. *Preq:* Sophomore standing.

**HLTH 3400 Health Promotion Program Planning 3 (3)** Students develop skills to conduct community health needs assessments and to plan and evaluate theoretically grounded health promotion intervention programs for diverse populations. Best practices for specific health behavior change interventions are identified. *Preq:* HLTH 2400 and HLTH 2980.

**HLTH 3500 Medical Terminology and Communication 3 (3)** Skills in building, analyzing, defining, pronouncing, and spelling medical terms related to the human body are developed and applied through electronic communication. *Preq:* Junior standing.

**HLTH 3610 Introduction to Health Care Economics 3 (3)** Introductory course in which students learn the basic economics of the institutions comprising the health-care industry. Topics include the underlying supply, demand, and institutional factors impacting health-care availability and cost of health care. May also be offered as APEC 3610.

**HLTH 3800 Epidemiology 3 (3)** Introduces epidemiological principles and methods used in the study of the origin, distribution, and control of disease. Health majors are given enrollment priority. *Preq:* STAT 2300, and at least one 2000-level HLTH course.

**HLTH 3950 Honors Research Seminar 3 (3)** Students review basic steps in the development of an honors research proposal and develop a draft of the proposal under the supervision of a faculty mentor. Students are also required to attend research presentations of senior departmental honors students. *Preq:* HLTH 3800 and Junior standing.

**HLTH 3980 Health Appraisal Skills 1 (3)** Utilizes laboratory experiences to measure health risk, interpret laboratory health data, and design personal health programs. Restricted to Health Science majors. *Preq:* HLTH 2980.

**HLTH 4000\* Selected Topics in Health 1-6 (3-18)** Topics in health selected to meet special and individualized interests of students. May be repeated for a maximum of nine credits, but only if different topics are covered. *Preq:* Junior standing and consent of instructor.

**HLTH 4010 Health Consumerism 3 (3)** Exploration of consumer decisions regarding health products and services emphasizing strategies for decision making. Health majors are given enrollment priority. *Preq:* Junior standing.

**HLTH 4020 Principles of Health Fitness 4 (3)** Students apply current theories concerning physiological effects of exercise to select populations; understand the relationship between exercise and various chronic diseases; and design, execute, and evaluate exercise programs in terms of safety and effectiveness. Students must be certified in CPR to enroll in this course. *Preq:* HLTH 3980. *Preq or concurrent enrollment:* BIOL 2230. *Coreq:* HLTH 4021.

**HLTH 4021 Principles of Health Fitness Laboratory 0 (1)** Non-credit laboratory to accompany HLTH 4020. *Coreq:* HLTH 4020.

**HLTH 4100\* Maternal and Child Health 3 (3)** Focuses on key issues concerning the health status and needs of mothers and children. Topics include primary health care, measurement and indicators of health status, health of minorities, role of families, and major programmatic interventions towards the health needs of these two groups.

**HLTH 4110 Health Needs of High Risk Children 3 (3)** Analysis and evaluation of health needs of high-risk families and special needs children from the prenatal period to age six. Emphasizes health maintenance and early intervention strategies. *Preq:* HLTH 4100.

**HLTH 4150 Public Health Issues in Obesity and Eating Disorders 3 (3)** In-depth review of prevalence, risk factors, consequences, and treatments of obesity and other eating disorders. Focuses on the public health importance of cultural norms, prevention, and early intervention related to obesity and eating disorders. *Preq:* Junior standing in Health Science.

**HLTH 4180 Professional Development for CVT 3 (3)** Course addresses general academic and professional development requirements for students pursuing the Cardiovascular Imaging Leadership Concentration of the Health Science degree. *Preq:* Consent of instructor.

**HLTH 4190 Health Science Internship Preparation Seminar 1 (1)** Preparation for internship experience. Includes topics such as résumé development, interviewing skills, internship agency selection, and responsibilities of student, department, and agency. *Preq:* Junior standing in Health Sciences.

**HLTH 4200\* Health Science Internship 1-6 (1-6)** Under supervision in an approved agency, students have an opportunity for on-the-job experiences. Students are placed in an agency and develop personal/professional goals and objectives appropriate to the setting, population, and health issues. Students create a comprehensive exit portfolio in a digital format. May be repeated for a maximum of six credits. *Preq:* HLTH 4190 and a minimum grade-point average of 2.0 and Junior standing in Health Science and consent of instructor.

**HLTH 4300\* Health Promotion of the Aged 3 (3)** Focuses on analysis and evaluation of health issues and health problems of the aged. Emphasizes concepts of positive health behaviors. Health majors are given enrollment priority. *Preq:* HLTH 2980.

**HLTH 4310 Public and Environmental Health** 3 (3) Principles of environmental health emphasizing understanding various health concerns created by the interactions of people with their environment. Students evaluate the impact of environmental factors on public health policy decisions. Meets specific area of need in environmental health issues.

**HLTH 4400 Managing Health Service Organizations** 3 (3) Provides the conceptual and theoretical foundation of management and organizational theory of health service organizations. Focuses on the role of health services managers and how they modify and maintain organizations.

**HLTH 4500\* Applied Health Strategies** 3 (3) Students plan, implement, and evaluate strategies to promote health through individual behavior changes. Both healthful and unhealthful behaviors are included. Examples include smoking cessation, weight management, and stress management. *Preq:* Health Science major.

**HLTH 4600 Health Information Systems** 3 (3) Focuses on the application of information systems to patient care and management support systems. Provides a general understanding of how the information needs of health professionals and health service organizations can be met through the proper acquisition, storage, analysis, retrieval, and presentation of data.

**HLTH 4700 International Health** 3 (3) Deepens students' knowledge of global health and how public health work is conducted internationally. Introduction to assessment of international health needs and designing, implementing, managing, and evaluating public health programs in international settings. *Preq:* HLTH 2980.

**HLTH 4750 Principles of Health Care Operations Management and Research** 3 (3) Provides a foundation in concepts, structure, and analysis that enables an understanding of the importance of production/operations management within health care organizations and systems. Includes training in operations research methods and objectives. *Preq:* HLTH 4900.

**HLTH 4780 Health Policy Ethics and Law** 3 (3) Critical examination of the legal and ethical dimensions of public health policy formation and change and how legal, ethical, and policy considerations influence health services administration and delivery. Health majors are given enrollment priority. *Preq:* HLTH 2020 and HLTH 2400 and HLTH 2980 and HLTH 3800.

**HLTH 4790 Financial Management and Budgeting for Health Service Organizations** 3 (3) Overview of basic principles of budgeting and financial management and analysis for health services organizations. Techniques for financial management are provided with an emphasis on health services environments. *Preq:* HLTH 4400.

**HLTH 4800 Community Health Promotion** 3 (3) Focuses on the participatory approach in the planning and implementation of community health programs. Emphasizes professional ethics, needs assessment, coalition building, proposal writing, and implementation of special events in the community. *Preq:* HLTH 3030 and HLTH 3400 and HLTH 3800 and Health Science major.

**HLTH 4900 Research and Evaluation Strategies for Public Health** 3 (3) Discussion of research in health. Focuses on analysis of reported research. Ethical, moral, and legal issues are discussed. *Preq:* HLTH 3800.

**HLTH 4950 Honors Thesis Seminar** 3 (3) Senior honors thesis seminar in public health sciences. Independent research is conducted under the supervision and guidance of a faculty mentor for students enrolled in departmental honors program in support of an honors thesis/service learning research project. *Preq:* HLTH 3950 and Senior standing.

**HLTH 4960 Honors Research Colloquium** 1 (1) Students enrolled in departmental honors present independent research conducted under the supervision of a faculty member in a public research forum to other honors students and public health professionals and/or submit a paper or presentation based on this research for publication. *Preq:* HLTH H495 and Senior standing.

**HLTH 4970 Creative Inquiry—Public Health** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of 12 credits.

**HLTH 4980\* Improving Population Health** 3 (3) Critical examination of current and emerging issues in improving public health practice and population health. Covers examples in empirical and applied research revealing future trends in population health. Health majors are given enrollment priority. *Preq:* HLTH 2400 and HLTH 2980 and HLTH 3800.

**HLTH 4990 Independent Study** 1-3 (1-3) Study of selected problems in health under the direction of faculty member chosen by the student. Student and faculty member develop a course of study designed for the individual student and approved by the department chair prior to registration. May be repeated for a maximum of six credits. *Preq:* Junior standing.

## HONORS

**HON 1900 Freshman Colloquium: Arts and Humanities (Literature)** 3 (3) Intellectually intensive seminar that engages freshman honors students in dialogue about the idea of the University. Explores key literary works that enhance understanding of historical eras, intellectual and artistic movements, or cultures. Topics vary. *Preq:* Membership in Calhoun Honors College.

**HON 1910 Freshman Colloquium: Arts and Humanities (Non-Literature)** 3 (3) Intellectually intensive seminar that engages freshman honors students in dialogue about the idea of the University. Explores historical eras, intellectual and artistic movements, or cultures emphasizing multiple tools of analysis, including literature, art, music, and film. Topics vary. *Preq:* Membership in Calhoun Honors College.

**HON 1920 Freshman Colloquium: Social Science** 3 (3) Intellectually intensive seminar that engages freshman honors students in dialogue about the idea of the University. Explores foundations and consequences of human thought and behavior at the individual and societal levels, with emphasis on concepts and tools that organize scholarly inquiry across the social and behavioral sciences. Topics vary. *Preq:* Membership in Calhoun Honors College.

**HON 1930 Freshman Colloquium: Cross-Cultural Awareness** 3 (3) Intellectually intensive seminar that engages freshman honors students in dialogue about the idea of the University. Explores traditions, customs, and value systems of peoples and cultures. Examines concepts and tools that organize scholarly inquiry into world cultures emphasizing non-Western societies. Topics vary. *Preq:* Membership in Calhoun Honors College.

**HON 1940 Freshman Colloquium: Science and Technology in Society** 3 (3) Intellectually intensive seminar that engages honors students in dialogue about the idea of the University. Explores interactions of the sciences and technology with society. Examines how science and technology are social enterprises and the impact of science and technology on attitudes, behaviors, and choices. Topics vary. *Preq:* Membership in Calhoun Honors College.

**HON 2010 Structures and Society** 3 (3) Interdisciplinary honors seminar that examines selected structures regarded as monuments to artistic creativity and technological genius and the ways that structures affect and are affected by the societies that produce them. *Preq:* Membership in Calhoun Honors College.

**HON 2020 Science, Culture, and Human Values** 3 (3) Interdisciplinary honors seminar that unifies natural scientific, social scientific, and humanistic disciplines into a holistic view of the modern world and its future. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2030 Society, Art, and Humanities (Honors)** 3 (3) Combines readings and methodologies from the social sciences, arts, and humanities to study the interrelationships among the disciplines and their societal effects. Subjects vary. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2040 Honors Study/Travel** 1 (3) Study/travel experience related to a three-credit Calhoun Honors Seminar. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2050 Current Topics** 1 (1) Seminar to expose students to current topics in the interpretation of documents, works of art, structures and scholarly materials. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2060 Controversies in Science and Technology** 3 (3) Interdisciplinary honors seminar that examines social issues related to science and technology, using perspectives from science, the social sciences, and humanities. May be repeated for a maximum six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.



**HON 2070 Reasoning, Critical Thinking, and Problem Solving 3 (3)** Interdisciplinary honors seminar that teaches a particular set of tools for thinking and analysis, showing how these tools can be applied to different kinds of problems in different disciplines. May be repeated for a maximum six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2090 Border Crossings: Experiences in World Cultures 1-3 (1-3)** Readings and studies that heighten understanding of world cultures and societies. Taken in conjunction with international educational experiences approved by Calhoun Honors College. May be repeated for a maximum of six credits, with a maximum of three credit hours per study abroad experience. *Preq:* Membership in Calhoun Honors College.

**HON 2100 Experiencing the Arts 3 (2)** Interdisciplinary exploration of the arts through seminar discussions and attendance at performing and visual arts events on campus. Exploration of arts and aesthetics leading to performance previews, reviews, and experiences of Brooks Center and Lee Gallery events. May be repeated for a maximum of nine credits. *Preq:* Membership in Calhoun Honors College. *Coreq:* HON 2101.

**HON 2101 Experiencing the Arts Laboratory 0 (3)** Non-credit laboratory to accompany HON 2100. *Coreq:* HON 2100.

**HON 2200 Studies in Social Science 3 (3)** Discipline specific social science seminar including a disciplinary introduction (anthropology, economics, history, political science, psychology or sociology) and a detailed examination of specific theories and methods within that discipline. May be repeated for a maximum of six credits, but only if different disciplines are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2210 Studies in Literature 3 (3)** Introduction to selected authors and literary works focused around a specific topic. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2220 Studies in Arts and Humanities 3 (3)** Exploration of music, literature, film, philosophy or another area in humanities by examining a discipline specific topic. Focus may be on a particular scholar, era or culture idea or concept specific to a particular arts/humanities discipline. May be repeated for a maximum of six credits, but only if different disciplines are covered. *Preq:* Membership in Calhoun Honors College.

**HON 2230 Studies in Communications 3 (3)** Explores various topics in communications. Focus may be on a particular type of communication, medium or theory. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Membership in Calhoun Honors College.

**HON 4000 Honors Contract 0 (0)** Advanced study and research taken in conjunction with any 3000- or 4000-level course. Contract requires prior approval by instructor and Honors Director. To be taken Pass/No Pass only. May be repeated once, but only if in conjunction with a different course. *Preq:* Membership in Calhoun Honors College.

**HON 4990 Honors Research 1-12 (1-12)** Honors directed research in an academic discipline. Topics include, but are not limited to, literature review, research design and execution, and reporting of results. May be repeated for a maximum of 12 credits. *Preq:* Membership in Calhoun Honors College.

## HORTICULTURE

*Professors:* J.W. Adelberg, H. Liu, L.B. McCarty, T. Whitwell, G. Zehnder; *Associate Professor:* J.E. Faust; *Assistant Professor:* D. Park *Extension Associates:* R. Polomski, E. Vincent

**HORT 1010 Horticulture 3 (3)** Environmental factors and horticultural practices affecting optimum production of floral, fruit, ornamental, and vegetable crops. Includes a survey of the various areas of horticulture and their importance to society.

**HORT 1020 Experience Horticulture 1 (2)** Students experience the art, science, business, and diversity of horticulture through visits to greenhouses, nurseries, botanical gardens, athletic fields, golf courses, orchards, farms, and research fields and laboratories. Students learn about horticulture from a cross section of professionals sharing their work experiences. *Preq:* Freshman or sophomore standing in Horticulture or Turfgrass.

**HORT 2020 Selected Topics 1-3 (1-3)** Introduction to developing trends, concepts or technologies in horticulture and/or turfgrass. May be repeated for a maximum of three credits, but only if different topics are covered. *Preq:* Consent of instructor.

**HORT 2080 Landscape Appreciation 3 (3)** Deepens students' appreciation of natural and built environments through a study of landscape elements, styles, and professions. Landscapes ranging in scale from residential to regional are critiqued, and design principles and landscape ethics are discussed.

**HORT 2100 Growing Garden Plants in the Fall 3 (2)** Focuses on growing techniques for the production of ornamental and edible horticultural crops during the fall growing season. Lectures focus on scheduling, fertilization, irrigation, integrated pest management and marketing. Labs focus on providing hands-on opportunities to identify and grow flowering crops and vegetables in greenhouses and the field. *Preq:* HORT 1010. *Coreq:* HORT 2101.

**HORT 2101 Growing Garden Plants in the Fall Laboratory 0 (3)** Non-credit laboratory to accompany HORT 2100. *Coreq:* HORT 2100.

**HORT 2110 Growing Garden Plants in the Spring 3 (2)** Focuses on growing techniques for the production of ornamental and edible horticultural crops during the spring growing season. Includes scheduling, manipulation of vegetative growth and flowering, nutritional management and plant growth regulation. Labs focus on providing hands-on opportunities to grow flowering crops and vegetables in the greenhouse and field. *Preq:* HORT 2100. *Coreq:* HORT 2111.

**HORT 2111 Growing Garden Plants in the Spring Laboratory 0 (3)** Non-credit laboratory to accompany HORT 2110. *Coreq:* HORT 2110.

**HORT 2120 Introduction to Turfgrass Culture 3 (3)** Studies of the introductory principles associated with the art and science of turfgrass culture. Develops an understanding of the history and evolution of turfgrasses and turfgrass culture. Explores career potentials in turfgrass management. Explains the basic scientific principles and techniques associated with the propagation and establishment of fine turfgrasses. *Preq:* BIOL 1030 and BIOL 1040.

**HORT 2130 Turfgrass Culture Laboratory 1 (2)** Provides hands-on activities and understanding of basic principles and techniques in turfgrass culture. Students learn all phases of turfgrass management including identification, turfgrass culture, common turfgrass pest identification and control. *Preq* or *concurrent enrollment:* HORT 2120.

**HORT 2710 Internship 1-6 (1-6)** Preplanned, practical, supervised work experience to give beginning students on-the-job learning opportunities that support classroom experience. Students submit monthly reports and present a departmental internship seminar. Undergraduates may accumulate a maximum of six credits for participation in HORT 2710 and/or 4710. *Preq:* Consent of instructor.

**HORT 3030 Landscape Plants 3 (2)** Woody, ornamental plants and their aesthetic and functional uses in landscape developments. Study covers habit of growth, ultimate size, texture effect, period of bloom, color, and cultural requirements. *Coreq:* HORT 3031.

**HORT 3031 Landscape Plants Laboratory 0 (3)** Non-credit laboratory to accompany HORT 3030. *Coreq:* HORT 3030.

**HORT 3040 Annuals and Perennials 3 (2)** Annual and perennial flowers' aesthetic appeal and functional uses and needs. Color, texture, bloom time, form, size, and growth requirements as they relate to designing, planting, and maintaining colorful landscapes. *Preq:* HORT 2080 and HORT 3030. *Coreq:* HORT 3041.

**HORT 3041 Annuals and Perennials Laboratory 0 (3)** Non-credit laboratory to accompany HORT 3040. *Coreq:* HORT 3040.

**HORT 3080 Sustainable Landscape Garden Design 3 (3)** Landscape planning of gardens using environmentally sensitive design, construction, and maintenance practices. Survey skills to obtain user perception and preference and environmental measurement skills are introduced. Offered fall semester only. *Preq:* HORT 1010.

**HORT 3090 Sustainable Landscape Garden Design Laboratory 1 (3)** Landscape garden design using sustainable environmentally sensitive concepts and practices. Techniques of sustainable landscape garden design including hand drawing, site assessment, client interview, user perception survey, plant selection, and professional presentation. Plant selection encourages establishing healthy ecosystems. Emphasis on interactions between design, installation, and maintenance phases. *Preq* or *concurrent enrollment:* HORT 3080.

**HORT 3100 Growing Landscape Plants 3 (2)** Principles, technologies, and techniques of landscape plant production and growth including environmental control and manipulation, water, nutrient and pest management, scheduling, propagation, and plant problem diagnostics. Emphasizes herbaceous ornamentals along with significant woody landscape plants. *Preq:* HORT 1010. *Coreq:* HORT 3101.

**HORT 3101 Growing Landscape Plants Laboratory 0 (3)** Non-credit laboratory to accompany HORT 3100. *Coreq:* HORT 3100.

**HORT 4000 Selected Topics 1-6 (1-6)** Advanced study of any aspect of horticulture and/or turfgrass not addressed in other courses. May be repeated for a maximum of six credits, but only if different topics are covered.

**HORT 4040\* Plant Propagation 3 (3)** Practices of plant propagation from seeds, bulbs, divisions, layers, cuttings, grafting, and plant tissue culture are introduced. Physiological principles of pollination and seed biology, plant growth, regulators, source sink relations, life cycles and developmental phase transitions explain the practices. Environmental and economic contexts frame the preferred practices.

**HORT 4050\* Plant Propagation Techniques Laboratory 1 (3)** Techniques of plant propagation, including sexual methods: germination, scarification, and stratification. Asexual methods, including grafting, budding, cuttings, layering, tissue culture divisions, and separations. Students visit local nurseries. *Preq or concurrent enrollment:* HORT 4040.

**HORT 4080 Horticulture Discovery and Inquiry 1-3 (1-3)** Students learn about horticulture through research, service learning, and/or creative inquiry projects. They explore a topic of interest with faculty, organize a quality proposal, complete the project, and report results to appropriate professional audiences. May be repeated for a maximum of nine credits.

**HORT 4090 Senior Capstone Course 3 (3)** Student cognitive, affective and psychomotor learning (skills) in the field of environmental horticulture is assessed using real world professional situations requiring the command, analysis and synthesis of knowledge and skills acquired during the undergraduate experience. *Preq:* Senior standing in Horticulture.

**HORT 4120\* Advanced Turfgrass Management 3 (2)** Advanced principles and practices associated with turfgrass management for golf courses, sports fields, sod production, and commercial lawn care. Topics include turfgrass physiology, plant growth and development, construction, turfgrass nutrition, irrigation, drainage, pesticide use and fate, and development of effective management systems. *Preq:* CSEN 2020 or HORT 2120. *Coreq:* HORT 4121.

**HORT 4121\* Advanced Turfgrass Management Laboratory 0 (3)** Non-credit laboratory to accompany HORT 4120. *Coreq:* HORT 4120.

**HORT 4200\* Applied Turfgrass Physiology 3 (3)** Advanced course in turfgrass science and management. Provides the current status and development of turfgrass stress physiology and research. Main topics include temperature, drought, traffic, edaphic stresses, new developments in the turf industry and environmental stewardship. *Preq:* HORT 2120 and HORT 2130.

**HORT 4270\* Urban Tree Care 3 (3)** Principles, practices, and problems of protecting and maintaining trees in urban and recreational areas. Examines environmental and biological factors affecting trees in high-use areas, their management and cultural requirements, and the practices necessary for their protection and care as valuable assets in the landscape. May also be offered as FOR 4270. *Preq:* FOR 2050 or HORT 3030.

**HORT 4330\* Landscape and Turf Weed Management 3 (2)** Weed management strategies that include cultural, biological, and chemical methods are studied for landscape and turfgrass areas. Problem-solving skills and herbicide characteristics are emphasized. May also be offered as PES 4330. *Coreq:* HORT 4331.

**HORT 4331\* Landscape and Turf Weed Management Laboratory 0 (2)** Non-credit laboratory to accompany HORT 4330. May also be offered as PES 4331. *Coreq:* HORT 4330.

**HORT 4550\* Just Fruits 3 (3)** Students explore the origins, biology, culture, and production of major temperate zone fruit—apples, berries, and cherries to pawpaws, peaches, and pomegranates, the familiar to the forbidden. They discover principles, practices, and technologies employed to grow, protect, and harvest the fruits that feed us from commercial orchards, organic farms, and backyards. *Preq:* HORT 1010.

**HORT 4560\* Organic Vegetable Production 3 (1)** Principles and practices of organic vegetable production, including site and variety selection, field and greenhouse production methods, and cultural practices to manage pests and weeds. Harvesting and post-harvest handling is also addressed. Emphasis is placed on sustainable practices, alternative methods, and reducing reliance on chemical inputs. *Coreq:* HORT 4561.

**HORT 4561\* Organic Vegetable Production Laboratory 0 (6)** Non-credit laboratory to accompany HORT 4560. *Coreq:* HORT 4560.

**HORT 4610\* Advanced Landscape Garden Design 4 (3)** Garden design for urban or other highly visible locations. A specific specialty garden with environmental education potential will be designed. Finished plans include detailed planting, installation and maintenance, and communication. Emphasis is on establishing healthy plant communities, habitat linkages, and healthy water and soil. Includes Honors sections. *Preq:* HORT 3080 and HORT 3090. *Coreq:* HORT 4611.

**HORT 4611\* Advanced Landscape Garden Design Laboratory 0 (3)** Non-credit laboratory to accompany HORT 4610. *Coreq:* HORT 4610.

**HORT 4650\* Plant Molecular Biology 3 (3)** Study of fundamental plant processes at both the cellular and molecular levels. Topics include genome structure and organization (both nuclear and organelar); regulation of gene expression and its role in cellular and whole-plant processes; transposable genetic elements; applications for biotechnology. *Preq:* Junior standing; and GEN 3020; and either BIOL 3040 or BIOL 3050.

**HORT 4710\* Advanced Internship 1-6 (1-6)** Preplanned work experience under competent supervision in approved agency dealing with horticultural endeavors. Gives advanced students on-the-job learning opportunities to apply acquired knowledge and skills. Monthly reports and final departmental seminar required. Undergraduates may accumulate a maximum of six credits for participation in HORT 2710 and/or 4710. *Preq:* Junior standing.

**HORT 4720\* Landscapes + Health 3 (3)** Explores the role of landscapes in human health and wellness. Historical healing places and contemporary urban environments are examined for evidence of psychological and physiological impacts. Readings include interdisciplinary research. *Preq:* Senior standing.

## HISTORIC PRESERVATION

*Professor:* J. Burden

**HP 4100\* History and Theory of Historic Preservation 3 (3)** Survey history of preservation that explores a variety of theoretical issues that impact the discipline. Provides a basis for critical evaluation of historic preservation. *Preq:* Three semesters of Art and Architectural History.

**HP 4110\* Archival Research and Oral History in Historic Preservation 3 (3)** Introduction to historic buildings and landscapes research. Emphasizes researching the physical and social history of buildings and places. Charleston and its environs provide case study projects for archival research.

**HP 4120\* Materials and Methods of Historic Construction 3 (3)** Survey of traditional materials and methods of construction in America from the 18th through the early 20th century. Scientific examination of historic construction provides case studies. Students are expected to have completed three semesters of Art and Architectural History.

## HISTORIC PRESERVATION (College of Charleston)

**HSPV 4100\* History and Theory of Historic Preservation (CofC) 3 (3)** Survey history of preservation that explores a variety of theoretical issues that impact the discipline. Provides a basis for critical evaluation of historic preservation. *Preq:* Three semesters of Art and Architectural History.

**HSPV 4110\* Archival Research and Oral History in Historic Preservation (CofC) 3 (3)** Introduction to historic buildings and landscapes research. Emphasizes researching the physical and social history of buildings and places. Charleston and its environs provide case study projects for archival research.

**HSPV 4120\* Materials and Methods of Historic Construction (CofC) 3 (3)** Survey of traditional materials and methods of construction in America from the 18th through the early 20th century. Scientific examination of historic construction provides case studies. Students are expected to have completed three semesters of Art and Architectural History.

**HUMANITIES**

*Professor:* S.K. Eisiminger; *Associate Professor:* A. Bennett

**HUM 3010 Humanities 3 (3)** Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with prehistory and continuing to the Renaissance.

**HUM 3020 Humanities 3 (3)** Introduction to humanistic studies focusing on relationships among disciplines—painting, sculpture, architecture, music, literature, philosophy, and drama—beginning with the 17th century and continuing to the present.

**HUM 3060 Creative Genius in Western Culture 3 (3)** Investigation of creativity through study of great innovators in art, literature, music, and ideas. May be repeated once for credit.

**HUM 3090 Studies in Humanities 3 (3)** Interdisciplinary approach to the humanities. Special subject matter varies according to the instructor and as approved by the chair of the English Department. May be repeated once for credit.

**HUM 4560\* Literature and Arts of the Holocaust 3 (3)** Addresses the Holocaust through literature, art, architecture, music, and film. Beginning with historical, political, and economic forces that contributed to the Holocaust, course then focuses on highly diverse creative responses to this event - responses that often reflect the difficulties and politics of these commemorative gestures. May also be offered as ENGL 4560. *Preq:* ENGL 3100.

**INDUSTRIAL ENGINEERING**

*Professors:* A.K. Gramopadhye, *Chair;* W.G. Ferrell Jr., S.J. Mason; *Associate Professors:* B.R. Cho, J.S. Greenstein, M.E. Kurz, M.E. Mayorga, B.J. Melloy, K.M. Taaffe; *Assistant Professors:* D.M. Neyens, A.J. Rodriguez; *Research Assistant Professors:* A.K. Childers

**IE 2000 Sophomore Seminar in Industrial Engineering 1 (1)** Addresses the industrial engineering program, best student practices, and career paths. Invited lecturers, as needed, and faculty provide lectures and demonstrations. *Preq:* ENGR 1060 or ENGR 1090, each with a C or better.

**IE 2010 Systems Design I 4 (3)** Introduction to the design of industrial engineering systems. Design methodologies are introduced in the context of a design process that includes identifying user needs; developing a design specification; generating, evaluating, refining, and selecting design concepts; detail design; constructing, testing, and refining prototypes; and delivering the product to the customer. *Preq:* ENGR 1060 with a C or better; and ENGL 1020 or ENGL 1030 with a C or better. *Coreq:* IE 2011.

**IE 2011 Systems Design I Laboratory 0 (3)** Non-credit laboratory to accompany IE 2010. *Coreq:* IE 2010.

**IE 2100 Design and Analysis of Work Systems 3 (2)** Introduction to the tools and techniques used to design and analyze work systems for human use, including process improvement, workplace design and an introduction to the field of human factors and ergonomics. *Preq:* ENGR 1060 with a C or better; and either ENGL 1020 or ENGL 1030 with a C or better. *Coreq:* IE 2101.

**IE 2101 Design and Analysis of Work Systems Laboratory 0 (3)** Non-credit laboratory to accompany IE 2100. *Coreq:* IE 2100.

**IE 2680 Creative Inquiry Seminar in Industrial Engineering 1 (1)** Students are introduced to creative inquiry methods, resources, and current activities in a seminar format. To be taken Pass/No Pass only. Includes Honors sections.

**IE 2800 Deterministic Operations Research 3 (3)** Introduction to operations research models, including linear programming, integer linear programming, transportation and assignment problems, and network flows. *Preq:* MATH 1060 or MATH 1070 with a C or better.

**IE 3000 Junior Honors Seminar 1 (1)** Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists students in preparing a research proposal for the senior thesis. *Preq:* Junior standing and admission to Departmental Honors Program.

**IE 3600 Industrial Applications of Probability and Statistics I 3 (3)** Introduces central concept that overall system performance can be improved by taking uncertainty into account, especially through the reduction of variability. Specific industrial applications, such as decision analysis, reliability and probabilistic inventory models, are emphasized. *Preq:* MATH 2060.

**IE 3610 Industrial Applications of Probability and Statistics II 3 (3)** Introduces central concept that apparent conflict between productivity and quality can be resolved through improvements in processes by introducing statistical thinking. Specific industrial applications, such as (static) simulation, quality control and reliability models, are emphasized. *Preq:* IE 3600.

**IE 3680 Professional Practice in Industrial Engineering 1 (1)** Seminar to orient students to issues of professional development and professional practice of industrial engineering.

**IE 3810 Probabilistic Operations Research 3 (3)** Probabilistic modeling of engineering systems. Topics include calculus-based probability, Markov processes, Poisson processes, queueing, and other selected topics. *Preq:* IE 2800 and IE 3600.

**IE 3840 Engineering Economic Analysis 3 (3)** Basic principles and techniques of economic analysis of engineering projects. Consideration of time, value of money, short- and long-term investments, replacement analysis, depreciation methods, cost allocation, and measures of cost effectiveness. *Preq:* MATH 1080.

**IE 3860 Production Planning and Control 3 (3)** Fundamentals of forecasting demand, scheduling production, and controlling the movement and storage of material associated with production are studied. State-of-the-art manufacturing techniques are discussed. *Preq:* IE 2800 or MATH 4400.

**IE 4000\* Honors Thesis 1-6 (1-6)** Individual or joint research project performed with a faculty mentor or committee of faculty. May be repeated for a maximum of six credits. *Preq:* IE 2680 and consent of mentor.

**IE 4020 Creative Inquiry Research 1-6 (1-6)** Research experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. These applied/basic research experiences are usually undertaken with a team under the mentorship of a faculty member or advanced graduate student. May be repeated for a maximum of six credits. *Preq:* Consent of mentor.

**IE 4030 Creative Inquiry Project 1-3 (1-3)** Project-oriented experience promoting reasoning, critical thinking, ethical judgment, communication skills, and an understanding of the scientific method and engineering design. Typical experiences include design projects in cooperative education or sponsored student competitions undertaken with a team, under the mentorship of a faculty member or advanced graduate student. May be repeated for a maximum of three credits. *Preq:* IE 2680 and consent of mentor.

**IE 4300\* Human Factors Engineering in Healthcare 3 (3)** Focuses on how industrial engineers help improve the quality and safety of patient care. Students learn how healthcare is different from traditional industrial engineering sectors. A substantial part of the course is focused on learning how to apply industrial engineering tools, specifically those grounded in human factors, to healthcare problems. *Preq:* IE 2100 or IE 4880 or PSYC 3640 or PSYC 3680 or PSYC 4350.

**IE 4400\* Decision Support Systems in Industrial Engineering 3 (2)** Study of design of decision support systems for production and service systems based on operations research models. Includes use of spreadsheets, databases, and integrated software development environments to implement decision support systems. *Preq:* ENGR 1090; or CHE 1300 and one of CPSC 1010 or CPSC 1110 or CPSC 1610. *Coreq:* IE 4401.

**IE 4401\* Decision Support Systems in Industrial Engineering Laboratory 0 (3)** Non-credit laboratory to accompany IE 4400. *Coreq:* IE 4400.

**IE 4440 International Perspectives in Industrial Management 1-6 (1-6)** Provides an international perspective to industrial management via organized plant visits to businesses in a foreign country and lectures by and discussions with senior operations managers. Cultural visits and lectures are also organized to provide a holistic perspective to cover cultural and economic environment of the host country. Students are responsible for travel costs. May be repeated for a maximum of six credits. May also be offered as MGT 4440. *Preq:* Consent of instructor.

**IE 4520\* Reliability Engineering 3 (3)** Probabilistic approach to assessing system reliability. Methods for analyzing serial, parallel, and complex systems. Reliability life testing and its acceleration are covered. Essential elements of maintainability are identified and related to system availability. *Preq:* IE 3610; or MATH 3020 and MATH 4000.

**IE 4560\* Supply Chain Design and Control 3 (3)** Industrial engineering aspects of supply chains, including design and control of material and information systems. *Preq:* IE 3610 and IE 3860.

**IE 4570\* Transportation and Logistics Engineering 3 (3)** Introduces transportation and logistics systems analysis from both analytical and practical perspectives. Covers methods for identifying level-of-service metrics and measuring system performance. Discusses key aspects of modeling, simulation, and other techniques for economic and quantitative analysis of transportation and logistics planning issues. *Preq:* Senior standing in an engineering, science, or management program; and MATH 1020 or MATH 1060 or MATH 1070.

**IE 4600\* Quality Improvement Methods 3 (3)** Study of modern quality improvement techniques presented in an integrated, comprehensive context. *Preq:* MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

**IE 4610\* Quality Engineering 3 (3)** Design aspects of quality and the engineer's role in problems of quality in production systems. *Preq:* IE 3610.

**IE 4620\* Six Sigma Quality 3 (3)** Study of DMAIC (Define, Measure, Analyze, Improve, and Control) elements of Six Sigma, project management, process analysis, quality function deployment, hypothesis testing, gage R&R, data analysis, multivariate analysis, design of experiments, statistical process control, and process capability analysis. *Preq:* One of CHE 3070 or IE 3600 or MATH 3010 or MATH 3020 or MATH 3090 or STAT 3010 or STAT 4110.

**IE 4630\* Quality in the Capital Projects Industry 3 (3)** Covers topics in quality and lean principles relevant to the capital projects industry. Provides a broad overview on quality concepts and philosophies, quality management and inspection tools applicable to capital projects, Six Sigma Approach, lean concepts and value stream mapping. *Preq:* MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

**IE 4650\* Facilities Planning and Design 3 (3)** Study of the principles and techniques of facility planning and design. Discusses economic selection of materials handling equipment and integration of this equipment into the layout plan to provide effective product flow in production, distribution, and service contexts. Includes quantitative techniques for evaluation of facility design. *Preq:* IE 2100 and IE 2800 and IE 3810.

**IE 4670 Systems Design II 3 (2)** Provides students with the challenge of integrating and synthesizing general engineering knowledge into creatively solving real-world, open-ended problems. This includes developing the problem statement, objectives, and criteria; data collection; technical analysis; developing and integrating recommendations; and presenting results. *Preq:* All of the following Industrial Engineering courses: IE 2010, 2100, 2800, 3600, 3610, 3680, 3810, 3840, 3860, 4400, 4610, 4650, and 4820. *Coreq:* IE 4671.

**IE 4671 Systems Design II Laboratory 0 (3)** Non-credit laboratory to accompany IE 4670. *Coreq:* IE 4670.

**IE 4690 Creative Inquiry Symposium in Industrial Engineering I (1)** Provides a forum for exchange of results and ideas in creative inquiry student projects. To be taken Pass/No Pass only. *Preq:* IE 3680.

**IE 4820\* Systems Modeling 4 (4)** The purpose, theory, and techniques of modeling systems with dynamic events. Students learn a powerful analytical process to use in the analysis and improvement of systems in several industries, including transportation, logistics, manufacturing and service systems. Incorporates professional simulation software as a tool in evaluating the system performance. *Preq:* IE 3610 and 3810; or MATH 4400 and MATH 4410 and MATH 3020.

**IE 4850\* Survey of Optimization Methods and Applications 3 (3)** Survey of deterministic and stochastic optimization methods, theory and algorithms. Modeling, analysis and applications of optimization to modern industrial engineering problems. *Preq:* One of IE 2800 or MATH 4400; and one of IE 3810 or MATH 4410.

**IE 4870\* Industrial Safety 3 (3)** Recognition and prevention of hazards; recognition and control of hazardous materials; developing and managing a safety program; designing inherently safe equipment and workplaces. *Preq:* MATH 1020 or MATH 1060 or MATH 1070; and junior standing.

**IE 4880\* Human Factors Engineering 3 (3)** Introduction to human performance and limitations in the design of effective and efficient systems. Covers issues related to changes in technology, impact of design on society, ethical issues in design of systems, and the cost benefits from designing systems and environments that often challenge perceived notions of benefits. *Preq:* Junior standing; and MATH 1020 or MATH 1060 or MATH 1070.

**IE 4890\* Industrial Ergonomics and Automation 3 (2)** Physical ergonomics and ergonomics in industrial settings, including work physiology, the physical environment, automated systems, and hybrid work systems. *Preq:* IE 2100. *Coreq:* IE 4891.

**IE 4891\* Industrial Ergonomics and Automation Laboratory 0 (3)** Non-credit laboratory to accompany IE 4890. *Coreq:* IE 4890.

**IE 4910\* Selected Topics in Industrial Engineering 1-3 (1-3)** Comprehensive study of any timely or special topic in industrial engineering not included in other courses. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.

## INTEGRATED PEST MANAGEMENT

*Professor:* R.G. Bellinger

**IPM 4010\* Principles of Integrated Pest Management 3 (3)** Origins, theory, and practice of integrated pest management. Relationships among crop production and protection practices are explored. Economics of various control strategies are considered. Integrated pest management field projects are studied. Conventional and integrated pest management approaches are compared. Multidisciplinary plant problem analysis is introduced. *Preq:* ENT 3010 or PES 4070 or PLPA 3100.

## INTERNATIONAL STUDIES

**IS 1010 Cross-Cultural Awareness International Experience 0 (0)** Study of cross-cultural awareness as part of an international/study abroad experience. Minimum duration of the study abroad experience is four weeks. May be repeated. To be taken Pass/No Pass only.

**IS 2100 Selected Topics in International Studies 3 (3)** Topics in cross-cultural awareness and intercultural communications are studied in situ as part of a study abroad program. Addresses the impact of culture on behavior in intercultural contact in professional and personal contexts. May be repeated for a maximum of six credits, but only if different topics are covered.

## ITALIAN

*Professor:* B.M. Zaczek; *Assistant Professor:* L. Barattoni; *Lecturers:* L. Borgotallo, J. Schmidt

**ITAL 1010 Elementary Italian 4 (3)** Introductory course stressing grammar, pronunciation, oral practice, and reading skills. Attention is given to practical everyday living as well as cultural considerations. *Coreq:* ITAL 1011.

**ITAL 1011 Elementary Italian Laboratory 0 (1)** Non-credit laboratory to accompany ITAL 1010. *Coreq:* ITAL 1010.

**ITAL 1020 Elementary Italian 4 (3)** Continuation of ITAL 1010. *Preq:* ITAL 1010. *Coreq:* ITAL 1021.

**ITAL 1021 Elementary Italian Laboratory 0 (1)** Non-credit laboratory to accompany ITAL 1020. *Coreq:* ITAL 1020.

**ITAL 2010 Intermediate Italian 3 (3)** Intermediate course to build on the foundation of previous language courses, with practice in listening, speaking, reading, and writing. Introduction to cultural perspectives through readings of literary prose selections. Includes Honors sections. *Preq:* ITAL 1020. *Coreq:* ITAL 2011.

**ITAL 2011 Intermediate Italian Laboratory 0 (1)** Non-credit laboratory to accompany ITAL 2010. *Coreq:* ITAL 2010.

**ITAL 2020 Intermediate Italian 3 (3)** Increasingly difficult readings in Italian literature, supplemented with classroom discussions and compositions. Includes Honors sections. *Preq:* ITAL 2010. *Coreq:* ITAL 2021.

**ITAL 2021 Intermediate Italian Laboratory 0 (1)** Non-credit laboratory to accompany ITAL 2020. *Coreq:* ITAL 2020.

**ITAL 2970 Creative Inquiry—Italian 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.

**ITAL 3010 Introduction to Italian Literature 3 (3)** Study of selected texts of Italian literature in their artistic, cultural, and social context. May include theme and genre studies. *Preq:* ITAL 2020.

**ITAL 3020 Modern Italian Literature 3 (0)** Study of selected works from major 19th- and 20th-century Italian authors, including Manzoni, Verga, Svevo, Moravia, Ginzburg. *Preq:* ITAL 2020.

- ITAL 3050 Intermediate Italian Conversation and Composition 3 (3)** Practice in the written and spoken language with emphasis on vocabulary, pronunciation, and comprehension. *Preq:* ITAL 2020.
- ITAL 3070 Italian Civilization and Culture 3 (3)** Study of the significant aspects of Italian civilization and culture through analysis of literary texts, paintings, films, and magazine articles. *Preq:* ITAL 2020.
- ITAL 3600 Italian Literature to 1600 3 (3)** Examines selected topics in Italian literature from the Middle Ages to 1600. Readings include works by Dante, Boccaccio, Petrarca, Franco, Castiglione and Machiavelli. *Preq or concurrent enrollment:* ITAL 3020 or ITAL 3050.
- ITAL 3970 Creative Inquiry—Italian 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- ITAL 3980 Directed Reading 1-3 (1-3)** Directed study of selected topics in Italian literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- ITAL 4000 Image of an Italian City 3 (3)** Study of historical, social, and architectural images of Italian cities through analysis of literary texts and films. *Preq:* ITAL 2020.
- ITAL 4050 Advanced Italian 3 (3)** Advanced language study emphasizing fluency in oral and written expression through discussion and analysis of contemporary Italian media. *Preq:* One 3000-level Italian course.
- ITAL 4550 Italian Film 3 (2)** Overview of Italian cinema. Topics may include history, genres, and major directors. *Preq:* ITAL 3050. *Coreq:* ITAL 4551.
- ITAL 4551 Italian Film Laboratory 0 (3)** Non-credit laboratory to accompany ITAL 4550. *Coreq:* ITAL 4550.
- ITAL 4750 Advanced Italian Seminar 3 (3)** Concentrated research and discussion on advanced topics in Italian literature, film, art, or drama. May be repeated for a maximum of six credits. *Preq:* One 4000-level Italian course.
- ITAL 4970 Creative Inquiry—Italian 1-4 (1-4)** Continuation of research initiated in ITAL 3970. Students complete their project and disseminate their research results. *Preq:* ITAL 3970.
- ITAL 4980 Selected Topics 3 (3)** Study of selected topics in Italian literature, language, and culture. Taught in Italian. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of department chair.
- JAPANESE**  
Associate Professors: T. Kishimoto, E.L. Williams;  
Lecturer: K. Shoji
- JAPN 1010 Elementary Japanese 4 (3)** Course for beginners in which fundamentals are taught and a foundation is provided for further study and the eventual ability to read and speak the language. The Japanese writing system is introduced. Students learn how to recognize and write the two alphabets Hiragana and Katakana. Three hours a week of classroom instruction and one hour a week in the language laboratory. *Coreq:* JAPN 1011.
- JAPN 1011 Elementary Japanese Laboratory 0 (1)** Non-credit laboratory to accompany JAPN 1010. *Coreq:* JAPN 1010.
- JAPN 1020 Elementary Japanese 4 (3)** Continuation of JAPN 1010. Students study Kanji characters. *Preq:* JAPN 1010. *Coreq:* JAPN 1021.
- JAPN 1021 Elementary Japanese Laboratory 0 (1)** Non-credit laboratory to accompany JAPN 1020. *Coreq:* JAPN 1020.
- JAPN 2010 Intermediate Japanese 3 (3)** Brief review of JAPN 1010 and 1020, with conversation, composition, and beginning of more serious reading of Japanese in short stories. Students study Kanji characters. *Preq:* JAPN 1020. *Coreq:* JAPN 2011.
- JAPN 2011 Intermediate Japanese Laboratory 0 (1)** Non-credit laboratory to accompany JAPN 2020. *Coreq:* JAPN 2010.
- JAPN 2020 Intermediate Japanese 3 (3)** Brief review of JAPN 2010, with conversation, composition, and dictation based on more difficult Japanese reading selections. Includes a continuation of Kanji characters. *Preq:* JAPN 2010. *Coreq:* JAPN 2021.
- JAPN 2021 Intermediate Japanese Laboratory 0 (1)** Non-credit laboratory to accompany JAPN 2020. *Coreq:* JAPN 2020.
- JAPN 2970 Creative Inquiry—Japanese 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.
- JAPN 3030 Intensive Conversation and Composition in Japan 3 (3)** Study of Japanese with native instructors at a university in Japan. All coursework conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 2020.
- JAPN 3050 Japanese Conversation and Composition 3 (3)** Practice in the spoken language with emphasis on vocabulary, Kanji, pronunciation, and comprehension; learning practical language skills and intercultural communication through various topics. *Preq:* JAPN 2020.
- JAPN 3060 Japanese Conversation and Composition 3 (3)** Continuation of JAPN 3050. More practice in the spoken language emphasizing vocabulary, Kanji, pronunciation, and comprehension. Learning practical language skills and intercultural communication through various topics. *Preq:* JAPN 3050.
- JAPN 3070 Japanese Civilization I 3 (3)** Study of the significant aspects of the culture of Japan. *Preq:* JAPN 2020.
- JAPN 3080 Japanese Civilization II 3 (3)** Study of significant aspects of the culture of Japan. *Preq:* JAPN 2020.
- JAPN 3160 Japanese for International Trade I 3 (3)** Spoken and written Japanese common to the Japanese-speaking world of business and industry emphasizing business practices and writing and translating business letters and professional reports. Cross-cultural references provide opportunity for comparative and contrastive analysis of American and Japanese cultural patterns in a business setting. *Preq:* JAPN 3060.
- JAPN 3970 Creative Inquiry—Japanese 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- JAPN 3980 Directed Reading 1-3 (1-3)** Directed study of selected topics in Japanese literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- JAPN 4010 Japanese Literature in Translation 3 (3)** Introduction to Japanese literature from 712 AD to the present. Cultivates an appreciation for Japanese literature and culture. All readings and discussions are in English. May not be used to satisfy general foreign language requirements.
- JAPN 4030 Internship in Japan 3 (3)** Minimum of one month of full-time work experience in Japan. All work activities with host companies are conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 2020.
- JAPN 4040 Cultural Studies in Japan 3 (3)** Study of Japanese cultural topics on site in Japan through lectures, field trips, small student group reconnaissance excursions, and reporting sessions. All activities are conducted in Japanese. May be repeated for a maximum of six credits. *Preq:* JAPN 2020.
- JAPN 4060 Introduction to Japanese Literature 3 (3)** Students read contemporary Japanese narrative fiction, poetry, and drama in their historical and social context. *Preq:* 3000-level Japanese course.
- JAPN 4110 Studies in the Japanese Language I 3 (3)** Advanced training in the spoken and written language with emphasis on formal expressions. *Preq:* JAPN 3060.
- JAPN 4120 Studies in the Japanese Language II 3 (3)** In-depth study of Kanji characters. *Preq:* JAPN 4110.
- JAPN 4160 Japanese for International Trade II 3 (3)** Study of language and cultural environment of the Japanese-speaking market, including the linguistic and cultural idioms that support global marketing in general and the international marketing of textiles, agricultural products, and tourism in particular. *Preq:* JAPN 3160.
- JAPN 4170 Japanese Culture and Society 3 (3)** Focuses on basic themes in Japanese culture found in social interaction and ritual behavior. Japanese social organization, including marriage and family patterns, neighborhood and community organization, and gender roles receive extensive attention. All readings and discussions are in English. May not be used to satisfy general foreign language requirements. May also be offered as ANTH 4170.
- JAPN 4900 Classical Japanese 3 (3)** Examination and analysis of premodern Japanese texts. Special emphasis is on the grammar and syntax of the classical language, its divergence from and influence upon the modern idiom. All coursework is conducted in Japanese. *Preq:* JAPN 3060.
- JAPN 4910 Senior Seminar in Japanese Literature 3 (3)** Close readings of various works of premodern and modern Japanese literature. Includes study of important authors and their representative works in prose and poetry. Familiarizes students with the cultural and linguistic nuances of literature in the original language. All readings and activities are in Japanese. *Preq:* JAPN 3060.

**JAPN 4970 Creative Inquiry—Japanese 1-4 (1-4)**  
Continuation of research initiated in JAPN 3970. Students complete their project and disseminate their research results. *Preq:* JAPN 3970.

**JAPN 4990 Selected Topics in Japanese Culture 3 (3)** Topic-generated examination of fundamental cultural themes in premodern and modern Japan, including, but not limited to, such topics as Japanese drama, poetry, prose, religious traditions, cinema, and folklore/mythology. May be repeated for a maximum of six credits, but only if different topics are covered. Readings and discussions are in English. May not be used to satisfy general foreign language requirements.

## LANGUAGE

**LANG 2500 Introduction to World Languages 3 (3)**  
Introduction to fundamental questions concerning the nature and use of human language throughout the world. Emphasizes the definition, genesis and theoretical characterization of language, as well as its role in social and political discourses. All readings and discussions are in English.

**LANG 2540 Introduction to World Cinemas 3 (2)** Introduction to the development of cinemas outside the United States through an examination of representative works, genres and movements in their cultural contexts. Conducted in English. All films are subtitled. *Coreq:* LANG 2541.

**LANG 2541 Introduction to World Cinemas Laboratory 0 (3)** Non-credit laboratory to accompany LANG 2540. *Coreq:* LANG 2540.

**LANG 2970 Creative Inquiry—Language 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

**LANG 3000 Introduction to Linguistics and Foreign Language Learning 3 (3)** Introduction to the field of linguistics, including the study of phonetics, phonology, morphology, syntax, and semantics. Includes discussion of issues pertaining to foreign language acquisition.

**LANG 3030 Study Abroad Transfer 3-6 (3-6)** Course for credit transfer of any course taken abroad during a department-approved study. Requires a minimum of two contact hours per week for at least 15 weeks or equivalent. Students may take a course outside their concentration. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Consent of department chair.

**LANG 3400 Cosmopolis: The Myth of the City 3 (3)** Cross-cultural inquiry into the idea of the city through literary, political, and philosophical texts as well as film and architecture. *Preq:* Junior standing.

**LANG 3420 Sacred and Profane Bodies 3 (3)** Cross-cultural inquiry into the ambivalence surrounding female sexuality implicit in images of women and, in particular, the division of women into earthly and divine categories. *Preq:* Junior standing.

**LANG 3560 Faces of Evil 3 (3)** Cross-cultural inquiry into evil as an ineradicable challenge to representation disclosed by notions of the monstrous, the enemy, the infinite, and death in literature, cultural theory, and the arts. *Preq:* Junior standing.

**LANG 3710 Language and Culture 3 (3)** Surveys key topics, theories, and methodological approaches in linguistic anthropology. Examines the complex relationships among language, culture, and communicative behavior and provides students with conceptual tools that inform the study of language in its cultural contexts. May also be offered as ANTH 3710.

**LANG 3970 Creative Inquiry—Language 1-4 (1-4)**  
Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**LANG 4000\* Phonetics 3 (3)** Study of basic phonetic concepts used in the study of sounds in language.

**LANG 4200 France and the Francophone World 3 (3)** Selected masterpieces of French and Francophone Culture are considered within their historical and cultural context. All readings and instruction are in English. No knowledge of the foreign language is required. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Sophomore standing.

**LANG 4500 Risk and Danger 3 (3)** Cross-cultural inquiry into the meanings of risk and danger as they are articulated in various literary and philosophical texts and films about gambling, duels, stunts, bullfights, wilderness adventure, and smoking. *Preq:* Junior standing.

**LANG 4540 Selected Topics in International Film 3 (2)** Presents subtitled films of specific world cultures and basic film theory and discourse applicable to the selected areas. Taught in English. May be repeated for a maximum of six credits with consent of department chair. May also be offered as ENGL 4540. *Preq:* ENGL 3100. *Coreq:* LANG 4541.

**LANG 4541 Selected Topics in International Film Laboratory 0 (3)** Non-credit laboratory to accompany LANG 4540. May also be offered as ENGL 4541. *Coreq:* LANG 4540.

**LANG 4550 Hispanic Film: Documentary and Feature 3 (3)** Overview of theory and discourse on Hispanic film. Through lectures, discussions, and films, students become acquainted with film as a vehicle for understanding the Hispanic World. Taught in English. Films are in Spanish with English subtitles. *Preq:* Sophomore standing.

**LANG 4600 Propaganda and the Totalitarian Recreation of the World 3 (3)** Cross-cultural inquiry into the various languages (philosophical, political, literary, and filmic, among others) that form a crucial weapon in the striving for hegemony over desire that marks the modern totalitarian project. *Preq:* Junior standing.

**LANG 4620 Borders 3 (3)** Cross-cultural inquiry into representations of physical and non-physical borders. Provides a theoretical framework in which various forms of borders, limits, and boundaries can be studied through literature and other artistic media. *Preq:* Junior standing.

**LANG 4850 Global Affairs and Governments 3 (3)**  
Designed for teachers and education students who wish to learn how to incorporate global affairs more fully into high school curricula. Overview of major topics involving foreign policies and world politics is provided. May also be offered as POSC 4850.

**LANG 4970 Creative Inquiry—Language 1-4 (1-4)**  
Continuation of research initiated in LANG 3970. Students complete their project and disseminate their research results. *Preq:* LANG 3970.

**LANG 4990 Language Portfolio 2 (2)** Students create a digital portfolio to demonstrate competencies in reasoning, critical thinking, problem solving skills, cross-cultural awareness, ethical judgment, and to document a study abroad or internship experience. Course also serves as a resource for academic and professional development. To be taken Pass/No Pass only.

## LANDSCAPE ARCHITECTURE

*Professors:* T. Schurch, K. Schwensen, *Interim Chair*; *Associate Professors:* R. Hewitt, H. Nassar, M. Powers; *Assistant Professor:* P. Russell; *Visiting Assistant Professors:* D. Lycke, D. Pearson. *Senior Lecturer:* M.E. McCubbin

**LARC 1150 Introduction to Landscape Architecture 3 (3)** Introduction to the foundations and contemporary sources of landscape architecture. The course surveys the relationship between landscape architecture and sustainability, medicine, engineering, art, the natural sciences, planning and development, psychology, recreation and tourism, architecture, preservation, and technology.

**LARC 1160 History of Landscape Architecture 3 (3)** History of design on the land from prehistory to the present. Overview of the interface of aesthetics, science, technology, and natural features that influence cultures in shaping places.

**LARC 1280 Technical Graphics 3 (2)** Introduction to rendering techniques, plan graphics, 3-D projection drawings, drafting skills, perspective drawing, and overview of computer graphics. *Preq:* Landscape Architecture major. *Coreq:* LARC 1281.

**LARC 1281 Technical Graphics Laboratory 0 (2)** Non-credit laboratory to accompany LARC 1280. *Coreq:* LARC 1280.

**LARC 1510 Basic Design I 3 (6)** Studio introduction to design fundamentals through 2-D and 3-D application of basic systems and development of attitudes essential to the creative design process. *Preq:* Landscape Architecture major.

**LARC 1520 Basic Design II 6 (12)** Further investigations into design fundamentals through 2-D and 3-D application of basic systems and development of attitudes essential to the creative design process. *Preq:* LARC 1510.

**LARC 1990 Creative Inquiry—Landscape Architecture I 3 (3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* Consent of faculty member/mentor.

**LARC 2510 Landscape Architecture Design Fundamentals 6 (1)** Compositional skills introduced in LARC 1510 and 1520 are applied to design in the landscape. Through research, design assignments and discussions, students derive and apply design principles to place, study the processes of design and develop an understanding of how design principles, plant materials and structures are used in the landscape. *Preq:* LARC 1520. *Coreq:* LARC 2511.

- LARC 2511 Landscape Architecture Design Fundamentals Laboratory 0** (10) Non-credit laboratory to accompany LARC 2510. *Coreq:* LARC 2510.
- LARC 2520 Site Design in Landscape Architecture 6** (1) Students apply lessons from LARC 2510 to site designs considering planting design, responsible land management strategies and appropriate use of materials. Also included are participatory and social behavioral aspects of design. Readings and seminar discussions are emphasized as integral to the design and decision making process. *Preq:* LARC 2510. *Coreq:* LARC 2521.
- LARC 2521 Site Design in Landscape Architecture Laboratory 0** (10) Non-credit laboratory to accompany LARC 2520. *Coreq:* LARC 2520.
- LARC 2620 Design Implementation I 3** (1) Basics of landscape architecture construction methods and construction documents, including site information gathering and analysis, basic site grading and drainage, cut and fill, principles of stormwater management, and sustainable land management related to implementation. Includes explorations in hand and computer graphic techniques used in construction drawings. *Preq:* Consent of instructor. *Coreq:* LARC 2621.
- LARC 2621 Design Implementation I Laboratory 0** (3) Non-credit laboratory to accompany LARC 2620. *Coreq:* LARC 2620.
- LARC 2930 Field Studies Internship 1-3** (1-3) Skill-based practical work experience to give beginning students on-the-job learning opportunities. Requires a minimum of five weeks of uninterrupted, supervised, practical experience with a preapproved commercial firm or public agency dealing with landscape architectural site issues. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.
- LARC 2990 Creative Inquiry—Landscape Architecture II 3** (3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARC 1990 and consent of faculty member/mentor.
- LARC 3510 Regional Design and Ecology 6** (1) Study and analysis of natural and cultural landscapes at the regional scale. Introduction of landscape ecology as an informant to design. Basic overview of geographic information systems. Regional and ecological issues are applied in a final site design. Also includes relevant reading, discussion, and writing. *Preq:* Senior standing. *Coreq:* 3511.
- LARC 3511 Regional Design and Ecology Laboratory 0** (10) Non-credit laboratory to accompany LARC 3510. *Coreq:* LARC 3510.
- LARC 3520 Urban Design Studio 6** (1) Landscape architectural design in the urban context. Students study urban issues and offer design solutions for urban areas. The course includes a reading and theory component, as well as an opportunity to collaborate with architecture students. Students attend an international field trip during Spring Break. *Preq:* LARC 2510. *Coreq:* LARC 3521.
- LARC 3521 Urban Design Studio Laboratory 0** (10) Non-credit laboratory to accompany LARC 3520. *Coreq:* LARC 3520.
- LARC 3620 Design Implementation II 3** (1) Advanced landscape architecture construction methods and construction documents, including site information gathering, analysis, site grading and drainage, cut and fill, principles of stormwater management, sustainable land management related to implementation, materials research and use, sustainable planting strategies, site demolition and construction management. Includes explorations in appropriate graphic communication techniques. *Preq:* Consent of instructor. *Coreq:* LARC 3621.
- LARC 3621 Design Implementation II Laboratory 0** (2) Non-credit laboratory to accompany LARC 3620. *Coreq:* LARC 3620.
- LARC 3990 Creative Inquiry—Landscape Architecture III 3** (3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARC 2990 and consent of faculty member/mentor.
- LARC 4050\* Urban Genesis and Form 3** (3) Exploration of urban forms and developments within their historical context through off-campus, on-site lectures and exposure to historic cities and sites. Students visit historic and contemporary cities and analyze those places through readings and direct observations. Offered in the summer only. *Preq:* LARC 2520.
- LARC 4180 Off-Campus Study Seminar 1** (1) Students study various cultural and environmental factors to inform and enhance their off-campus experiences in Istanbul, Barcelona, Genoa, or Charleston. *Preq:* Landscape Architecture major.
- LARC 4190 Off-Campus Field Study 3** (3) Intensive study of place in an off-campus setting as context for design. Numerous class trips to significant sites in the area of the off-campus programs. Bus trips to distant sites are also planned. *Preq:* LARC 4510.
- LARC 4210 Landscape Architectural Seminar 3** (3) Lectures and seminars dealing with pertinent topics related to environmental, technological, and theoretical issues in landscape architecture, land planning, and urban design. May be repeated for a maximum of six credits. *Preq:* Junior standing.
- LARC 4230\* Environmental Issues in Landscape Architecture 3** (3) Overview of environmental and ecological issues and their relationship to landscape architecture practice and design. *Preq:* LARC 4520.
- LARC 4280 Landscape Architecture Computer-Aided Design 3** (2) Introduces students to the use of computer technology in the landscape architectural design process. Covers the basics of computer applications used in the industry for conceptualizing, drafting, modeling, and graphic communications. *Preq:* Landscape Architecture major. *Coreq:* LARC 4281.
- LARC 4281 Landscape Architecture Computer-Aided Design Laboratory 0** (2) Non-credit laboratory to accompany LARC 4280. *Coreq:* LARC 4280.
- LARC 4330\* Historic Preservation in Landscape Architecture 3** (3) Study of historic landscape preservation in a number of contexts, including gardens, vernacular landscapes, parks, cemeteries, and battlefields. *Preq:* LARC 4520.
- LARC 4380 Advanced Computer-Aided Design 3** (2) Advanced study in computer-aided design for students wishing to develop their skills beyond LARC 4280. Students develop advanced skills in illustrative drawings, construction drawings, desktop publishing, and other computer-based applications. *Preq:* LARC 4280. *Coreq:* LARC 4381.
- LARC 4381 Advanced Computer-Aided Design Laboratory 0** (2) Non-credit laboratory to accompany LARC 4380. *Coreq:* LARC 4380.
- LARC 4430\* Community Issues in Landscape Architecture 3** (3) In-depth study of issues relevant to community design. Overview of physical design and related social issues. *Preq:* LARC 4520.
- LARC 4510 Community Design Studio 6** (1) Studio focused on the study and design of communities and public spaces. Students explore multicultural, historical and ecological layers of community, as well as the role of landscape management and the creative design process to add new dimensions of meaning to these places. *Preq:* LARC 3520. *Coreq:* LARC 4511.
- LARC 4511 Community Design Studio Laboratory 0** (10) Non-credit laboratory to accompany LARC 4510. *Coreq:* LARC 4510.
- LARC 4520 Off-Campus Studio 6** (1) Off-campus landscape architecture studio in Istanbul, Charleston, Genoa, or Barcelona. *Preq:* LARC 4510. *Coreq:* LARC 4521.
- LARC 4521 Off-Campus Studio Laboratory 0** (10) Non-credit laboratory to accompany LARC 4520. *Coreq:* LARC 4520.
- LARC 4530\* Key Issues in Landscape Architecture 3** (3) Overview of research in landscape architecture and study of relevant research methods. Students write proposals for their own projects positioned within the larger context of research in the profession. *Preq:* Junior standing.
- LARC 4620 Landscape Architectural Technology III 3** (2) Advanced overview of construction materials and methods used in project implementation. Study characteristics, strengths, nominal sizes and uses of materials (asphalt, brick, concrete, stone, wood). Field trips, exercises, and preparation of construction documents develop understanding of how design ideas are realized in built form. *Preq:* LARC 3620. *Coreq:* LARC 4621.
- LARC 4621 Landscape Architectural Technology III Laboratory 0** (2) Non-credit laboratory to accompany LARC 4620. *Coreq:* LARC 4620.
- LARC 4710 Chinese and Japanese Garden Traditions 3** (3) This course examines Chinese and Japanese classical garden traditions within the context of the classical arts. Emphasis is placed on understanding garden design principles that deal with scenery manipulation and visualization, as well as an in-depth study of the Chinese classical design language, grammar and vocabulary. *Preq:* Junior standing.
- LARC 4720 South Carolina's Landscapes: Then and Now 3** (3) This course investigates South Carolina's designed and cultural landscapes. It addresses the human impacts and settlement patterns, the state's natural and physical environments, and focuses on South Carolina's landscape legacy of the built environment. *Preq:* Junior standing.

**LARC 4900 Directed Studies and Projects in Landscape Architecture** 1-5 (1-5) Comprehensive studies and/or research of special topics not covered in other landscape architecture courses. May be repeated for a maximum of ten credits. *Preq:* Consent of instructor.

**LARC 4910 Honors Research Methods for Landscape Architecture** 1-3 (1-3) Students investigate various research methodologies in landscape architectural design or related areas and apply to student generated project(s). Students generate a proposal for Landscape Architecture Honors Research. *Preq:* Junior standing and membership in Calhoun Honors College and consent of Department Honors program advisor.

**LARC 4930 Professional Office Internship** 1-3 (1-3) Office experience for advanced students. On-the-job learning requires a minimum of five uninterrupted sequential weeks of employment under the direct supervision of a preapproved registered landscape architect, architect, urban planner, or civil engineer. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* LARC 3520 and LARC 3620 and consent of instructor.

**LARC 4940 Landscape Architecture Honors Research** 2-3 (2-3) Independent, student-generated research on a preapproved topic conducted under the supervision and weekly guidance of a faculty member. Second in a sequence of three required courses for students enrolled in Departmental Honors Program. Written interim report and presentation to faculty and honors students are required before the end of the semester. May be repeated for a maximum of six credits. *Preq:* LARC 4910 and membership in Calhoun Honors College.

**LARC 4950 Landscape Architecture Honors Thesis** 2-3 (2-3) Continuation of independent research, conducted under the supervision and weekly guidance of a faculty member. Third in a sequence of three required courses for students enrolled in Departmental Honors Program. Written thesis is submitted and presented before the end of the semester to qualify for Departmental Honors. *Preq:* LARC 4940.

**LARC 4990 Creative Inquiry—Landscape Architecture** IV 3 (3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. *Preq:* LARC 3990 and consent of faculty member/mentor.

**LARC 5030 Landscape Architecture Portfolio** 3 (3) Presentation of the concepts of conventional portfolios, as well as electronic portfolios, both of which are designed to record and communicate students academic experiences and achievements. The role of a portfolio within the landscape architecture profession is emphasized through lectures, demonstrations and presentations.

**LARC 5510 Landscape Architecture Design V** 6 (1) Studio work and adjunct lectures featuring complex problem-solving projects involving regional design analysis and planning, city planning and urban design, complex building relationships and intense site utilization in an urban setting. Studio may be taken in Charleston, Genoa, or Barcelona. *Preq:* LARC 4520. *Coreq:* LARC 5511.

**LARC 5511 Landscape Architecture Design V Laboratory** 0 (10) Non-credit laboratory to accompany LARC 5510. *Coreq:* LARC 5510.

**LARC 5520 Landscape Architecture Exit Project** 6 (12) Studio work on student-selected professional level exit project including design-build project or substantive research project. Exit studio synthesizes and builds on skills developed throughout the Landscape Architecture program. Also provides opportunities for students to inquire into areas of interest not otherwise covered. *Preq:* LARC 4520.

**LARC 5620 Landscape Architectural Technology** IV 2 (4) Studio course for the integration of design and technology. *Preq:* LARC 4620, and professional standing. *Preq or concurrent enrollment:* LARC 5520.

**LARC 5810 Landscape Architectural Professional Practice** 3 (3) Lectures dealing with general consideration of landscape architectural office procedures. Study of the professional relationships of the landscape architect to client and contractor, including problems of ethics, law, business, and portfolio development. *Preq:* Senior standing.

## LATIN

**LATN 1010 Elementary Latin** 4 (4) Course for beginners designed principally to teach the reading of the language.

**LATN 1020 Elementary Latin** 4 (4) Continuation of LATN 1010. *Preq:* LATN 1010.

**LATN 2010 Intermediate Latin** 3 (3) Review of the fundamental principles of grammar in conjunction with readings from the Classical period. *Preq:* LATN 1020.

**LATN 2020 Intermediate Latin** 3 (3) Continuation of LATN 2010 with the introduction of writings from the late Latin and Medieval periods. *Preq:* LATN 2010.

## LAW

*Associate Professors:* F.L. Edwards, M.E. Mowrey;  
*Lecturers:* J.R. Jahn, V.L.S. Ward-Vaughn

**LAW 3220 Legal Environment of Business** 3 (3) Examination of both state and national regulation of business. Attention is given to the constitution and limitations of power, specific areas in which governments have acted, and the regulations that have been imposed in these areas. Includes Honors sections. *Preq:* Junior standing.

**LAW 3330 Real Estate Law** 3 (3) The nature of real property and means of acquiring rights therein: conveyance of ownership, creation and execution of deeds, mortgages, etc., landlord and tenant relationships, shared concepts, and government regulation.

**LAW 3990 Internship in Legal Studies** 1-3 (1-3) Faculty-supervised legal internship to give students learning opportunities that support their classroom experiences. Requires a minimum of six full-time weeks. Course enrollment and internship must occur in the same semester. Simultaneous credit cannot be received for another internship offering. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Junior standing.

**LAW 4050\* Construction Law** 3 (3) Provides a practical knowledge of legal principles applied to the construction process and legal problems likely to be encountered by practicing construction professionals. Topics include construction contracting, liability, claims and warranties, documentation, and responsibility and authority of contracting parties. *Preq:* LAW 3220 or LAW 3330.

**LAW 4060 Sports Law** 3 (3) Provides awareness of sport-related legal issues. Topics include contracts, torts, arbitration, mediation, criminal liability, intellectual property, gender equity, disabilities, drug testing, and professional and amateur organizations. *Preq:* LAW 3220 and Senior standing.

**LAW 4200\* International Business Law** 3 (3) Intensive examination of the historical background of modern public and private international law; selected issues of public international law—human rights, law of war, United Nations' system, and international litigation; selected issues of private international law—international sales, international trade, and formation and operation of multinational businesses. *Preq:* LAW 3220.

**LAW 4990 Selected Topics** 1-3 (1-3) In-depth examination of timely topics in legal studies. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Senior standing and consent of instructor.

## LIBRARY

*Librarians:* L. Bodenheimer, J.G. Comfort, J.E. Cross, P.A. Draper, B.A.W. Helsel, M.F. Kohl, P.G. Munson, L.P. Sill, D.S. Taylor, P.J. Tyler, K.L. Wall, *Dean;* *Associate Librarians:* A.C. Burns, G.M. Cochrane, C.A. Colthorpe, C.C. Cooper, E.J. Holley, *Chair;* S.D. Johnson, D.G. Julian, S.R. Schilf, K.M. Wesley; *Assistant Librarians:* S.M. Dutkiewicz, J.R. Friedman, M.S. Futral, S. George-Williams, R.L. Hollandsworth, S.J. Robichaud, E.J. Rock, G. Teague, R.D. Wilmott

**LIB 1990 Creative Inquiry—The Libraries** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

**LIB 2990 Creative Inquiry—The Libraries** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

**LIB 3010 Introduction to Patent Searching** 1 (1) Introduction to patents with an emphasis on how patents fit into the research process. Students develop skills in creating effective patent search strategies, and evaluating and presenting their search results.



**LIB 3990 Creative Inquiry—The Libraries** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

**LIB 4990 Creative Inquiry—The Libraries** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits.

## LANGUAGE AND INTERNATIONAL HEALTH

*Associate Professors:* D.J. Smith, G. Tissera, *Director;* Y. Zhang; *Lecturers:* J.D. Martin-Armas, R. Tremolada

**LIH 1270 Introduction to Language and International Health** 1 (1) Survey of international health and related career opportunities, focusing on the two distinct emphasis areas of the major: community development and health administration. To be taken Pass/No Pass only.

**LIH 2970 Creative Inquiry—Language and International Health** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration.

**LIH 3970 Creative Inquiry—Language and International Health** 1-4 (1-4) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**LIH 4000 Internship Abroad** 3 (3) One semester, full-time internship in a health care or a health administration setting abroad. To be taken Pass/No Pass only. *Prq:* Second semester Junior standing.

**LIH 4970 Creative Inquiry—Language and International Health** 1-4 (1-4) Continuation of research initiated in LIH 3970. Students complete their project and disseminate their research results. *Prq:* LIH 3970.

## LANGUAGE AND INTERNATIONAL TRADE

*Professors:* P.R. Heusinkveld, *Director;* C.K. Nakuma, *Associate Dean;* *Associate Professors:* T. Kishimoto, M.M. Rojas-Massei, J. Schmidt, G.E. Tissera, Y. Zhang; *Assistant Professor:* E.R. Touya; *Lecturers:* C.S. Edwards, L.J. Ferrell, M. Zamora

**LIT 1270 Introduction to Language and International Trade** 1 (1) Survey of the nature of international trade and related career opportunities. Information and applications of specific relevance to tourism, agriculture, and textile industries are offered. To be taken Pass/No Pass only.

**LIT 2970 Creative Inquiry—Language and International Trade** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Prq:* Consent of faculty member.

**LIT 3970 Creative Inquiry—Language and International Trade** 1-4 (1-4) Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**LIT 4000 Language and International Trade Internship** 1-3 (1-3) Mandatory internship with an international company in the U.S. or abroad. May be part-time or full-time during the summer or academic semester for a minimum of 1400 hours. After completing the internship, students register for three credits of LIT 4000 and write a research paper in the target language. To be taken Pass/No Pass only. *Prq:* CHIN 3160 or FR 3160 or GER 3160 or JAP 3160 or SPAN 3160; and twelve credit hours in a Language and International Trade technical option.

**LIT 4020 Language and International Trade Directed Study** 3 (0) Directed study of an individual project in language and international trade. To be taken Pass/No Pass only.

**LIT 4970 Creative Inquiry—Language and International Trade** 1-4 (1-4) Continuation of research initiated in LIT 3970. Students complete their project and disseminate their research results. *Prq:* LIT 3970.

## LEISURE SKILLS

*Lecturers:* D.M. Anderson

**LS 1000 Selected Topics** 1 (3) Presentation of leisure skills not covered in other courses. May be repeated for a maximum of three credits, but only if different topics are covered.

**LS 1010 Challenge Recreation Activities** 1 (1) Encourages students to broaden their leisure skills and improve self-image through challenge activities. Classroom instruction stresses how to get started safely in flying, scuba, canoeing, skiing, windsurfing, mountaineering, hang-gliding, ballooning, and other challenge activities.

**LS 1110 Lapidary Arts** 1 (3) Students learn the techniques used to transform raw materials such as gemstones, minerals, gold, and silver into objects of art—primarily jewelry.

**LS 1130 Wood Carving** 1 (3) Introduction to the art of wood carving. Students learn about types of wood, tools, carving, and shop safety.

**LS 1250 Budget Travel** 1 (3) Teaches the necessary skills to travel internationally on a budget. Students learn how to get the best airfares, research destinations, and build an itinerary. Packing, security, local transportation, and culture/reverse-culture shock are also discussed.

**LS 1260 Group Initiatives** 1 (2) Students learn to lead people in group initiatives, also called team building exercises, with the goal of developing trust, cooperation, risk-taking, and leadership among participants. Students learn specific initiatives to lead, as well as how to bring groups to their intended goals.

**LS 1330 Womens Shotgun Shooting** 1 (3) Introduces basic shotgun shooting skills and firearm safety. Topics include gun fitting, skeet and trap shooting, and gun and range safety. Course is designed to provide women a comfortable environment in which to learn the necessary skills to participate in shotgun shooting.

**LS 1340 Women's Hunting Traditions** 1 (3) Students receive hands-on instruction in shooting sports and the sport of hunting. Students are introduced to the safe and responsible use of firearms and archery, and learn how to participate safely in hunting.

**LS 1350 Women's Riflery** 1 (3) Introduces students to the basics of rifle shooting and safety. Students learn basic shooting skills and are exposed to more advanced topics, such as reloading, external ballistics and long range shooting. This course is designed to give women a comfortable environment to learn the skills necessary to participate in the sport of riflery.

**LS 1410 Top Rope Climbing** 1 (3) Basic rock climbing skills, including philosophy, safety, knots, climbing techniques, site and supplies selection, and nature/conservation issues are covered.

**LS 1430 Mountain Biking** 1 (3) Introduces the sport of mountain biking; guides students on techniques and procedures to plan and undertake rides. Covers both on-trail and off-trail bike mechanics used to keep bikes in proper working order.

**LS 1440 Performance Cycling** 1 (3) Provides aspiring cyclists with all the information necessary to be safe and successful cyclists. Students learn how to ride safely on open roadways, group riding skills, bike maintenance, and bike mechanics.

**LS 1450 Camping and Backpacking** 1 (3) Basic camping and backpacking skills including map and compass reading, outdoor cooking, camping hazards and safety, site selections, and trip planning.

**LS 1470 Alpine Skiing** 1 (3) Basic downhill snow skiing instruction including equipment selection, safety, and maintenance; parallel turns; edging; carved and linked turns; wedeling; and safety and etiquette. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.)

**LS 1490 Snowboarding** 1 (3) Basic snowboarding instruction including equipment selection; safety; conditioning; and skills such as stopping, techniques for turning, and riding lifts. There is an additional fee for this course. Taught during Christmas recess. (Contact the Department of Parks, Recreation and Tourism Management in October.) May not be taken concurrently with LS 1470 or LS 3470.

**LS 1560 Riflery** 1 (3) Introduces the basics of rifle shooting and firearm safety. Students progress from beginning rifle shooting to more advanced topics such as reloading, external ballistics, and long-range shooting.

- LS 1570 Shotgun Shooting 1 (3)** Introduces students to basic shotgun shooting skills and firearm safety. Topics include gun fitting, chokes, gauges, ammunition, and different shotgun disciplines such as skeet, trap shooting, and sporting clays.
- LS 1580 Archery 1 (3)** Introduces students to the basic principles and skills of archery and helps them develop proper shooting form and marksmanship.
- LS 1590 Hunting Traditions 1 (3)** Basic, hands-on instruction in the shooting sports (shotgun, rifle, and archery) and the sport of hunting. Designed to introduce students to the safe and responsible use of firearms and archery equipment and safe hunting practices. Students are required to complete the South Carolina Department of Natural Resources Hunter Education certification.
- LS 1610 Turkey Hunting 1 (3)** Exposes students to the skills, techniques, and history of turkey hunting. Students learn gun and hunting safety; shotgun, muzzleloading, and archery hunting techniques; tracking; and basic calling techniques.
- LS 1640 Whitewater Kayaking 1 (3)** Flat-water and whitewater skills, techniques, safety, rescue, equipment selection and maintenance, and selection of routes/trips to participate in basic white-water kayaking. Students must possess basic swimming skills to enroll in this course.
- LS 1650 Inland Kayak Touring 1 (3)** Introduction to basic skills necessary for safe enjoyment of flat-water (non-tidal waters: lakes, slow moving rivers) kayak touring. Students learn equipment selection, strokes, safety, and rescue techniques. Students must demonstrate swimming competence to enroll in this course.
- LS 1670 Canoeing 1 (3)** Basic instruction in the nomenclature, strokes, and safety techniques in canoeing. Students must possess basic swimming skills to enroll in this course.
- LS 1690 Sailing 1 (3)** Basic instruction in the nomenclature, safety and rescue techniques, and skills required to skipper sailing craft. Students must possess basic swimming skills to enroll in this course.
- LS 1710 Windsurfing 1 (3)** Basic windsurfing instruction including rigging, launching, tacking, jibbing, rig and foot steering, safety, maintenance, equipment selection, rules-of-the-road, and racing techniques are covered. Offered Fall Break and first summer session. There is an extra fee for this course. Students must have the ability to swim 3000 yards and tread water for five minutes to enroll in this course.
- LS 1730 Bass Fishing 1 (3)** Provides basic knowledge and skills necessary to participate successfully in bass fishing.
- LS 1750 Fly Fishing 1 (3)** Introductory course in the techniques of fly-fishing. Students learn casting, fly-tying, and equipment selection.
- LS 1760 Beginning Fly Tying 1 (3)** The art of fly tying. Students learn basic fly tying techniques and gain a knowledge of materials and tools used in fly tying.
- LS 1770 Saltwater Fly Tying 1 (3)** Introduction to tying flies for saltwater applications of fly fishing.
- LS 1790 Scuba I 1 (3)** Teaches basic open water diving techniques; prepares students to complete requirements for the open water diving certification. Certifications are granted by an internationally recognized and accepted certifying agency. Students are required to pass a swim test required by certifying agency.
- LS 1830 Introduction to Rugby 1 (3)** Introduces students to the sport of Rugby. Covers history of the game, rules, and skills such as passing, kicking, and decision making.
- LS 1850 Bowling 1 (3)** Basic instructional program on techniques of bowling.
- LS 1870 Frisbee Sports 1 (3)** Focuses on the rules, history, and skills necessary for participating in various frisbee sports. Heavy emphasis is placed on Ultimate Frisbee and Frisbee Golf.
- LS 1880 Disc Golf 1 (3)** Introduces students to basic disc golf skills and knowledge. Topics include development of basic throwing skills, rules of the game, game strategy and disc golf etiquette.
- LS 1890 Tennis 1 (3)** Fundamental course stressing rules, strokes, and strategy, with ample opportunity for practice.
- LS 1940 Racquetball 1 (3)** Basic skills, knowledge of rules, strategy, and basic strokes.
- LS 1950 Intermediate Racquetball 1 (3)** Builds on knowledge gained in LS 1940. Students learn advanced swing mechanics, game strategy, and other advanced skills. *Preq:* LS 1940. Students who have not taken LS 1940 may demonstrate that they possess equivalent skill and obtain a registration override.
- LS 1960 Introduction to Billiards 1 (3)** Introductory course in the history, rules, and skills necessary to participate in billiards. Students learn different types of games, proper shot techniques, and equipment selection.
- LS 1980 Golf 1 (3)** Fundamental course stressing rules, strategy, and basic strokes.
- LS 1990 Intermediate Golf 1 (3)** Builds on the knowledge gained in LS 1980. Students learn to apply rules to common golf situations, improve ball striking, and course management. The skills and strategies taught are designed to improve existing golf scores. *Preq:* LS 1980. Students who have not taken LS 1980 may demonstrate that they possess equivalent skill and obtain a registration override.
- LS 2000 Traditional Sports 1 (3)** Introductory course in the history, rules, and skills necessary to participate in traditional sports. Students learn about and participate in basketball, volleyball, football, and softball.
- LS 2020 Field Hockey 1 (3)** Introduces the fundamental skills, history, and rules of field hockey.
- LS 2030 Lacrosse 1 (3)** Introduces the fundamental skills, history, and rules of men's and women's lacrosse.
- LS 2040 Soccer 1 (3)** Introduces the history, rules, and fundamental skills of soccer.
- LS 2100 Learn to Dance 1 (2)** Students develop an understanding of the qualities of dance, recognize the importance of dance as a leisure pursuit, and learn to dance to difference types of music. Dances include shag, waltz, cha-cha, foxtrot, as well as current dance trends.
- LS 2110 Introduction to Belly Dance 1 (2)** Introduces students to the Middle Eastern belly dance. In addition to learning choreography and belly dance skills, students are introduced to the traditions and origins of Middle Eastern belly dance.
- LS 2120 Belly Dance II 1 (2)** Designed to build on the dance and musicality skills developed during Introduction to Belly Dance, this course also introduces students to choreography, additional dance styles, improvisation, and the use of finger cymbals when they participate as a member of a percussion section. *Preq:* LS 2110.
- LS 2130 Middle Eastern Dance 1 (2)** Explores the various dance styles associated with middle eastern countries. Students learn dances, rhythms and traditions from Egypt, Libya, Morocco, Saudi Arabia, Lebanon and Turkey.
- LS 2140 Modern Dance 1 (3)** Introduction to modern dance techniques with emphasis on developing the style of movement and understanding the dance art form.
- LS 2160 Contra Dance 1 (2)** Introduces students to the social dance of Contra. Students learn the origin and history of Contra along with the basic dance steps and styles.
- LS 2180 Ballroom Dance 1 (2)** Students develop an understanding of advanced dance methods, learn about dance at social and competitive levels, and increase knowledge of a variety of both smooth and Latin steps. Dances include tango, cha-cha, waltz, foxtrot, and swing.
- LS 2190 Country Western Dance 1 (2)** Introduces traditional country western dance. Students learn traditional couples dances, line dances, and barn dances.
- LS 2200 Shag 1 (2)** Develops an understanding of the South Carolina state dance, its history and impact on the state. Students learn more advanced steps in shag, including bellyroll, sugarfoot, slide step, tiptoe up the ladder, pivot, and the thirteen steps.
- LS 2210 Intermediate Shag Dance 1 (2)** Builds on skills learned in LS 2200. Students improve their ability to improvise, add style, and add many different moves to their dance vocabulary. *Preq:* LS 2200.
- LS 2220 Advanced Shag 1 (2)** Exposes students to a competition level of shag. Students learn to break down a dance routine and to choreograph short routines. *Preq:* LS 2210.
- LS 2270 Introduction to Swing Dance 1 (2)** Introduction to vintage swing dance created in the 1920s–1950s, including Charleston, Lindy Hop, Jitterbug, and optional acrobatic moves used in performance and competition.
- LS 2280 Intermediate Swing Dance 1 (2)** Builds on skills learned in LS 2270 by improving students' ability to improvise, add style, musicality, and many additional moves to add to their dance vocabulary. *Preq:* LS 2270.
- LS 2290 Advanced Swing Dance 1 (2)** Focuses on competition level and style of swing dance. Students learn to break down and teach a routine to beginners. Students also learn the skills necessary to create and choreograph a short routine. *Preq:* LS 2280.
- LS 2310 Bosu 1 (3)** Introduces the group aerobic style of Bosu, which concentrates on physical stability, core strength, and general fitness.

**LS 2320 Core Stability Training 1 (3)** Teaches fundamentals of core training. Students learn basic anatomy, proper strength training, and how to design a program to fit their fitness goals.

**LS 2330 Aerobic Dance 1 (3)** Instruction in the development of skills for the safe improvement and maintenance of cardiovascular fitness, flexibility, and muscle tone utilizing dance movements and techniques.

**LS 2350 Basic Yoga 1 (3)** Develops flexibility, strength, sensitivity, energy, and a sense of relaxation through the study of basic yoga postures, conscious breathing, and meditation techniques.

**LS 2360 Power/Ashtanga Yoga 1 (3)** Power/Ashtanga Yoga is a comprehensive workout based on the Eastern philosophy of K. Pattabhi. Students learn the eight limbs of this philosophy and the rigorous series of postures that produce a high power, athletic workout with the purpose of detoxifying impurities in the body.

**LS 2370 Kripalu Yoga 1 (3)** Great emphasis is placed on learning breath work techniques to combine directly with the various kripalu yoga postures. The goal is to teach individuals the physiological reactions produced by this type of yoga in developing and restoring health.

**LS 2380 Vinyasa Flow Yoga 1 (3)** Explores the energetic, fluid movement of Yoga postures in sync with conscious breathing. Students study creative sequences using classical as well as innovative and advanced Yoga postures. *Preq:* LS 2350.

**LS 2420 Meditation and Relaxation 1 (2)** Exposes students to the benefits of relaxation and meditation techniques. Students learn different techniques used to relieve stress and promote relaxation.

**LS 2450 Pilates 1 (3)** Study of the history, philosophy, and fundamental movement concepts of Pilates.

**LS 2460 Intermediate Pilates 1 (3)** Course is designed to expand students' knowledge and practice of the principles, techniques and exercises learned in the basic Pilates course. *Preq:* LS 2450.

**LS 2500 Marathon Training 1 (3)** Provides students with the resources and knowledge to train for and successfully complete a marathon.

**LS 2510 Running and Jogging 1 (3)** Introduces the various components important to improving overall fitness level through a running or jogging activity. Topics include proper stretching exercises, nutrition, workout program design, and proper running techniques.

**LS 2580 Self Defense 1 (3)** Basic physical defense that incorporates risk avoidance and awareness techniques with basic physical defense options.

**LS 2640 Aikido 1 (3)** Introduces the modern Japanese martial art of Aikido.

**LS 2660 Hapkido 1 (3)** Introduces the fundamental skills and techniques of the self-defense based Korean martial art of Hapkido.

**LS 2700 Sports Officiating 1 (3)** Practical study of officiating for various sports. Includes studies and practical application of officiating rules and mechanics. Sports studied include football, basketball, softball, soccer, and introductions to a variety of other team sports.

**LS 2750 Red Cross First Aid/CPR 1 (3)** Gives students the knowledge and skills necessary to prevent, recognize, and provide basic care for infants, children, and adults with injuries and sudden illness.

**LS 2760 First Aid/CPR for the Professional 1 (2)** This American Red Cross CPRAED for the Professional Rescuer course teaches those with a duty to act the skills needed to respond appropriately to breathing cardiac emergencies, including the use of an Automated External Defibrillator (AED) to care for a victim of cardiac arrest.

**LS 2770 Lifeguarding 1 (3)** Students gain the knowledge and skills to prevent, recognize and respond to emergencies and to provide care for injuries and sudden illness. Upon course completion, students receive a lifeguarding certification from the American Red Cross.

**LS 2780 Wilderness First Aid 1 (2)** This American Red Cross Wilderness First Aid with Adult CPR course provides individuals involved with wilderness activities with the knowledge and skills to prevent, recognize and provide basic care for injuries and sudden illness when more advanced help is not immediately available.

**LS 2910 Outdoor Leadership 1 (3)** Introduces the skills necessary to lead others in a backcountry environment. Focus is on wilderness travel skills, minimum impact, group dynamics, leadership skills and decision making. Course also includes certification in Wilderness First Aid.

**LS 3470 Advanced Alpine Skiing 1 (3)** Advanced downhill snow skiing instruction in such techniques as mogul skiing, check turns, free-style, and racing. There is an additional fee for course. Taught over Christmas break. Credit is awarded for spring semester. (Contact Department of Parks, Recreation and Tourism Management in October.) *Preq:* LS 1470.

**LS 3560 Riflery II 1 (2)** Students build upon skills previously learned in the basic riflery course, and learn advanced skills, such as using ballistic software and chronographs, precision long range shooting and advanced reloading. *Preq:* LS 1560.

**LS 3580 Advanced Shotgun Skeet 1 (2)** Introduces students who have taken the basic shotgun course to the shotgun game of Skeet. Students learn the rules and techniques necessary to competitively participate in Skeet. *Preq:* LS 1570.

**LS 3890 Intermediate Tennis 1 (3)** Develops skills necessary to play at a competitive level of tennis. Students learn mechanically sound tennis skills, court positioning, court movement, proper shot selection, and strategic insight into the game. *Preq:* LS 1890.

## MATHEMATICAL SCIENCES

*Professors:* W.P. Adams, J.R. Brannan, W.C. Bridges, Jr., N.J. Calkin, C.L. Cox, V.J. Ervin, X. Gao, P.D. Gerard, H.S. Hill, Jr., P.C. Kiessler, K.B. Kulasekera, R.B. Lund, G.L. Matthews, W.F. Moss III, J.R. Rieck, D.R. Shier, R.L. Taylor, *Chair:* D.D. Warner, M.M. Wiecek; *Associate Professors:* J. Brown, E.S. Dimitrova, C.M. Gallagher, W. Goddard, J.A. Hoffacker, K.L. James, E.W. Jenkins, T.R. Khan, H.K. Lee, H. Maharaaj, C. Park, J.K. Peterson, L. Rebholz, M.J. Saltzman, X. Sun, C.L. Williams; *Assistant Professors:* P. Belotti, J. Dogbey, B.H. Fralix, Z.S. Hazari, J. Luo, M. Macaulley, C.S. McMahan, M. Mitkovski, G.D. Potvin, S. Poznanovikj, M.J. Schmoll, J.L. Sharp, A. Tyminski, H. Xue, J.R. Yoon; *Senior Lecturers:* S.S. Biggers, M.E. Cawood, J.E. Cottingham, T.A. Johnson, R.M. Martinez-Dawson, J.I. McKnew, B.A. Novick, S.A. Prevost, M.A. Reba, D.M. Simms, I.V. Viktorova; *Lecturers:* N. Bannister-Sinwell, E.H. Breazel, R.E. Davidson, C.A. Davis, R.S. Dubsy, E. Gallagher, A.A. Guest, J.M. Hanna, M.L. Hanna, Jr., N. Hubing, J.B. Lassiter, D.A. Moss, J. R. Newton, T.F. Parrott, M. Rios-Adams, L.J. Shick, A.K. Stoddard, T.C. Teitloff, J. Van Dyken, S.E. Walker; *Visiting Professor:* J.D. Fulton; *Visiting Assistant Professor:* N.L. Chenette; *Visiting Lecturers:* N. Hubing, A. Keaton, P.P. King

**MATH 1010 Essential Mathematics for the Informed Society 3 (3)** Topics include logic and computers, probability and statistics, and financial mathematics. Specific topics include Boolean algebra, digital data formats, randomness, graphical representation of data, inference and estimation; interest, annuities, and amortization. Not open to students who have received credit for MATH 3010, 3020, 3090, or STAT 3010. *Preq:* Any MATH or STAT course or a score of 50 or higher on the Clemson Mathematics Placement Test.

**MATH 1020 Introduction to Mathematical Analysis 3 (3)** Intuitive approach to the concepts and applications of calculus. Topics include functions and graphing, differentiation, and integration. Applications from social, biological, and management sciences are presented. Not open to students who have received credit for MATH 1060. *Preq:* Any MATH or STAT course or a score of 60 or higher on the Clemson Mathematics Placement Test.

**MATH 1030 Elementary Functions 3 (2)** Gateway course for MATH 1060. Comprehensive treatment of functions and analytic geometry with applications including polynomial, rational, algebraic, exponential, logarithmic, and trigonometric functions. Not open to students who have received credit for MATHS 105. To be taken Pass/No Pass only. *Preq:* Any MATH or STAT course or a score of 65 or higher on the Clemson Mathematics Placement Test. *Coreq:* MATH 1031.

**MATH 1031 Elementary Functions Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1030. *Coreq:* MATH 1030.

- MATH 1040 Precalculus and Introductory Differential Calculus 4 (4)** Relevant precalculus and algebra review, limits, continuity and introduction to differential calculus. The combination of MATH 1040 and MATH 1070 covers the same calculus material as MATH 1060. MATH 1040 alone cannot be substituted for any calculus course. To be taken Pass/No Pass only. Not open to students who have received credit for MATH 1060. *Prq:* Any MATH or STAT course or a score of 65 or higher on Clemson Mathematics Placement Test.
- MATH 1050 Precalculus 5 (4)** Extensive treatment of topics chosen to prepare students for the study of calculus. Special emphasis is given to polynomial, rational, exponential, logarithmic, and trigonometric functions and their graphs, as well as basic and analytic trigonometry. Students who have received credit for any other mathematical sciences course will not be allowed to enroll in or receive credit for MATH 1050. To be taken Pass/No Pass only. *Coreq:* MATH 1051.
- MATH 1051 Precalculus Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1050. *Coreq:* MATH 1050.
- MATH 1060 Calculus of One Variable I 4 (4)** Topics include analytic geometry, introduction to derivatives, computation and application of derivatives, integrals, exponential and logarithm functions. Includes Honors sections. *Prq:* MATH 1030 or MATH 1040 or MATH 1050 or a score of 80 or better on the Clemson Mathematics Placement Test.
- MATH 1070 Differential and Integral Calculus 4 (4)** Continuation of MATH 1040. Successful completion of MATH 1040 and MATH 1070 is equivalent to the completion of MATH 1060. Continuation of differential calculus and an introduction to integral calculus. Not open to students who have received credit for MATH 1060. *Prq:* MATH 1040.
- MATH 1080 Calculus of One Variable II 4 (4)** Topics include transcendental functions, applications of integration, integration techniques, indeterminate forms, improper integrals, parametric equations, polar coordinates, and infinite series. Includes Honors sections. *Prq:* MATH 1060 or MATH 1070.
- MATH 1110 Calculus II for Biologists 4 (4)** Selected topics from integral calculus, eigenvalues and eigenvectors of matrices and differential equations are used to encourage the use of mathematics, computational tool and biological science in the study of relevant biological models. Credit toward a degree will be given for only one of MATH 1080 and MATH 1110. *Prq:* MATH 1060 or MATH 1070.
- MATH 1150 Contemporary Mathematics for Elementary School Teachers I 3 (3)** Cooperative learning groups, manipulatives, and concrete models are used to demonstrate logical reasoning, problem-solving strategies, sets and their operations, numeration systems, properties and operations of whole numbers, number theory, prime and composite numbers, divisibility, common factors and multiples. Open to Elementary, Early Childhood, and Special Education majors only. *Prq:* Any MATH or STAT course or a score of 50 or higher on the Clemson Mathematics Placement Test.
- MATH 1160 Contemporary Mathematics for Elementary School Teachers II 3 (3)** Continuation of MATH 1150. Manipulatives and concrete models are used for properties, operations, and problem solving for integers, elementary fractions, rational numbers, and real numbers. Selected topics in statistics and probability are introduced with a hands-on approach to learning. Restricted to Elementary, Early Childhood, and Special Education majors. *Prq:* MATH 1150.
- MATH 1170 Mathematics for Elementary School Teachers I 3 (2)** Problem-solving strategies, logic, algebraic thinking, sets, relations, functions, numeration systems, whole numbers, integers, number theory, fractions, decimals, applications of percent, real numbers with their computational algorithms and properties are explored. Content, according to state standards, is taught with appropriate methodology for teaching K-6. *Prq:* MATH 1010. *Coreq:* MATH 1171.
- MATH 1171 Mathematics for Elementary School Teachers I Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1170. *Coreq:* MATH 1170.
- MATH 1180 Mathematics for Elementary School Teachers II 3 (2)** Simple probability and descriptive statistics are reviewed. Two- and three-dimensional geometry including polygons, polyhedra and their properties; congruence, similarity, and constructions; coordinate system; standard measurement, area, surface area, volume; and motion geometry are explored. Content, according to State standards, is taught with appropriate methodology for teaching K-6. *Prq:* MATH 1170. *Coreq:* MATH 1181.
- MATH 1181 Mathematics for Elementary School Teachers II Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1180. *Coreq:* MATH 1180.
- MATH 1190 Introduction to Discrete Methods 3 (3)** Topics normally include elementary logic and methods of proof; sets, functions, and relations; graphs and trees; combinatorial circuits and Boolean algebra.
- MATH 1290 Problem Solving in Discrete Mathematics 3 (2)** Problem-solving approach to learning mathematics is applied to topics in modern discrete mathematics. Typical selection of topics includes logic and proof, sets, relations, functions, mathematical induction, graphs and trees, counting techniques, recurrence equations. For Bachelor of Science and Bachelor of Arts majors in Mathematical Sciences only. Credit may not be received for both MATH 1190 and MATH 1290. *Prq:* MATH 1060 or MATH 1070. *Coreq:* MATH 1291.
- MATH 1291 Problem Solving in Discrete Mathematics Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1290. *Coreq:* MATH 1290.
- MATH 1990 Problem Solving in Mathematics 3 (2)** Functions and graphs, mathematical modeling, and applications. Applications from management and life and social sciences are presented. Specific topics include linear, quadratic, polynomial, exponential, and logarithmic functions with emphasis on problem solving. Students who have received credit for any other mathematical sciences course will not be allowed to enroll in or receive credit for MATH 1990. To be taken Pass/No Pass only. *Coreq:* MATH 1991.
- MATH 1991 Problem Solving in Mathematics Laboratory 0 (2)** Non-credit laboratory to accompany MATH 1990. *Coreq:* MATH 1990.
- MATH 2060 Calculus of Several Variables 4 (4)** Topics include real valued functions of several variables, multiple integration, differential calculus of functions of several variables, vector field theory. Includes Honors sections. *Prq:* MATH 1080 or MATH 1110.
- MATH 2070 Multivariable Calculus 3 (3)** Introduction to the calculus of several variables, differential calculus and optimization of several variables, multiple integrals. Topics from the management sciences are used to illustrate the above concepts. May not be taken by students who have passed MATH 2060. *Prq:* MATH 1020 or MATH 1060 or MATH 1070.
- MATH 2080 Introduction to Ordinary Differential Equations 4 (4)** Introduction to the study of differential equations and their application to physical problems. Topics include exact, series, and numerical solutions; solutions by means of Laplace transforms; and solutions of systems of differential equations. Includes Honors sections. *Prq:* MATH 2060.
- MATH 2100 Applied Matrix Algebra 3 (3)** Introduction to the basic principles of matrix algebra with applications to the behavioral and managerial sciences. Major areas of application include linear programming, directed graphs, and game theory. *Prq:* MATH 1020 or MATH 1060 or MATH 1070.
- MATH 2160 Geometry for Elementary School Teachers 3 (3)** Informal treatment of the basic concepts of geometry. Open to Elementary, Early Childhood, and Special Education majors only. *Prq:* MATH 1160.
- MATH 2500 Introduction to Mathematical Sciences 1 (1)** Introduction to areas of study, degree options, career choices, and professional development in mathematical sciences. Includes guidelines and requirements for portfolio development and an introduction to ethical issues.
- MATH 2990 Creative Inquiry-Mathematical Sciences 1-3 (1-3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits. *Prq:* Consent of faculty member/mentor.
- MATH 3020 Statistics for Science and Engineering 3 (3)** Calculus based statistics course in methodology for collecting, organizing, and interpreting data. Topics include understanding variability, graphical and numerical summarization of data, introductory probability, normal and related distributions, statistical inference, basic experimental design, and simple linear regression. Statistical software is used. *Prq:* MATH 2060.
- MATH 3080 College Geometry 3 (3)** Theorems and concepts more advanced than those of high school geometry. Treatment of the various properties of the triangle, including the notable points, lines, and circles associated with it. *Prq:* MATH 1060 or MATH 1070.

- MATH 3110 Linear Algebra 3 (3)** Introduction to the algebra of matrices, vector spaces, polynomials, and linear transformations. Includes Honors sections. *Preq:* MATH 1080 or MATH 1110.
- MATH 3150 Advanced Topics in Mathematics for Elementary Teachers 3 (3)** Course builds and expands upon content from previous elementary mathematics courses. Covers investigation of two- and three-dimensional shapes; scale and scale factor; ratio and proportional reasoning; relationships between perimeter, area, surface area and volume; relationships between fractions, decimals, and percents. Open to Elementary, Early Childhood, and Special Education majors only. *Preq:* MATH 2160.
- MATH 3160 Problem Solving for Mathematics Teachers 3 (3)** Course emphasizes problem solving and builds and expands upon previous mathematics content courses by examining connections between number and operations; algebra; data analysis and probability; geometry; and measurement. Open to Elementary, Early Childhood, and Special Education majors only. *Preq:* MATH 2160.
- MATH 3190 Introduction to Proof 3 (3)** Introduces mathematical proofs with topics that include proof techniques, elementary logic, induction, sets, functions, and relations. *Preq:* MATH 1080 or MATH 1110.
- MATH 3600 Intermediate Mathematics Computing 3 (3)** Intermediate-level introduction in using computers to solve problems in the mathematical sciences. Fundamental concepts of procedural programming including flow control, modular construction, primitive data structures, recursion, and graphics are applied to problems in applied mathematics, probability, statistics, discrete mathematics, and operations research. *Preq:* MATH 1080 or MATH 1110.
- MATH 3650 Numerical Methods for Engineers 3 (3)** Application of undergraduate mathematics and basic engineering principles with emphasis on numerical methods, computer programming and the use of mathematical software packages in the solution of engineering problems. *Preq:* ENGR 1090 and MATH 2080, each with a C or better.
- MATH 3820 Honors Seminar I 1 (1)** Weekly seminar to prepare students in Departmental Honors Program for independent senior research. At the end of the second semester, each student must have identified a research topic and a faculty advisor. May be repeated for a maximum of two credits. *Preq:* Junior standing in departmental honors program.
- MATH 3990 Creative Inquiry—Mathematical Sciences 1-3 (1-3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits. *Preq:* Consent of faculty member/mentor.
- MATH 4000\* Theory of Probability 3 (3)** Principal topics include combinatorial theory, probability axioms, random variables, expected values; special discrete and continuous distributions, jointly distributed random variables, correlation, conditional expectation, law of large numbers, central limit theorem. Includes Honors sections. *Preq:* MATH 2060.
- MATH 4020\* Statistics for Science and Engineering II 3 (3)** Principal topics include simple linear regression, multiple regression and correlation analysis, one-way analysis of variance, multiple comparison, multifactor analysis of variance, experimental design. Computation and interpretation of results are facilitated through use of statistical computer packages. *Preq:* MATH 3020.
- MATH 4030\* Introduction to Statistical Theory 3 (3)** Principal topics include sampling distributions, point and interval estimation, maximum likelihood estimators, method of moments, least squares estimators, tests of hypotheses, likelihood ratio methods, regression and correlation analysis, introduction to analysis of variance. Includes Honors sections. *Preq:* MATH 4000.
- MATH 4060\* Sampling Theory and Methods 3 (3)** Probability-based treatment of sampling methodology. Theory and application of estimation techniques are treated using simple and stratified random sampling, cluster sampling, and systematic sampling. *Preq:* MATH 4000; and one of MATH 3020 or STAT 2300 or STAT 3090.
- MATH 4070\* Regression and Time-Series Analysis 3 (3)** Theory and application of the regression and time series. Approaches to empirical model building and data analysis are treated. Computation and interpretation of results are facilitated through the use of interactive statistical packages. *Preq:* MATH 3110 and MATH 4000; and one of MATH 3020 or STAT 2300 or STAT 3090.
- MATH 4080\* Exploration and Analysis of Secondary Mathematics 3 (3)** In-depth exploration and analysis of important underlying ideas in the secondary mathematics curriculum. An emphasis is placed on reasoning and proof as students investigate topics in algebra, geometry, probability, statistics and calculus. *Preq:* MATH 2060.
- MATH 4100 Number Theory 3 (3)** Introduction to theory of integers and related number systems. Topics include historical development, principle of mathematical induction, divisibility, primes, congruences, number-theoretic functions, primitive roots, quadratic residues, and diophantine equations. *Preq:* MATH 1080 or MATH 1110.
- MATH 4110\* Introduction to Combinatorics 3 (3)** Introductory course in combinatorial analysis. Topics include enumeration, graph theory, posets, and extremal combinatorics. *Preq:* MATH 3110; and either MATH 1190 or MATH 3190.
- MATH 4120\* Introduction to Modern Algebra 3 (3)** Introduction to the concepts of algebra. Topics include the number system and the elementary theory of groups, rings, and fields. Includes Honors sections. *Preq:* MATH 3110.
- MATH 4190\* Discrete Mathematical Structures I 3 (3)** Applies theoretical concepts of sets, functions, binary relations, graphs, Boolean algebras, propositional logic, semigroups, groups, homomorphisms, and permutation groups to computer characteristics and design, words over a finite alphabet and concatenation, binary group codes, and other communication or computer problems. Includes Honors sections. *Preq:* MATH 3110.
- MATH 4300 Actuarial Science Seminar I 1 (1)** Problem-solving seminar to prepare students for the Society of Actuaries' Exam P or the Casualty Actuarial Society's Exam I (Probability). *Preq:* MATH 4000.
- MATH 4310 Theory of Interest 3 (3)** Comprehensive treatment of the theory of interest including from a calculus-based continuous viewpoint. Topics include simple and compound interest and discount, nominal and effective rates, force of interest, basic and general annuities, yield rates, amortization and sinking funds, and applications to bonds, mortgages, and other securities. *Preq:* MATH 2060.
- MATH 4320 Actuarial Science Seminar II 1 (1)** Problem-solving seminar to prepare students for the Society of Actuaries' Exam FM or the Casualty Actuarial Society's Exam 2 (Financial Mathematics). *Preq:* MATH 4310.
- MATH 4340\* Advanced Engineering Mathematics 3 (3)** Fourier series, Laplace and Fourier transform, and numerical methods for solving initial value and boundary-value problems in partial differential equations are developed. Applications to diffusion wave and Dirichlet problems are given. Matrix methods and special functions are utilized. *Preq:* MATH 2080.
- MATH 4350\* Complex Variables 3 (3)** Elementary functions; differentiation and integration of analytic functions; Taylor and Laurent series; contour integration and residue theory; conformal mapping, Schwartz-Christoffel transformation. Includes Honors sections. *Preq:* MATH 2060.
- MATH 4400\* Linear Programming 3 (3)** Introduction to linear programming covering the simplex algorithm, duality, sensitivity analysis, network models, formulation of models, and the use of simplex codes to solve, interpret, and analyze problems. Includes Honors sections. *Preq:* MATH 2060 and MATH 3110.
- MATH 4410\* Introduction to Stochastic Models 3 (3)** Introductory treatment of stochastic processes, finite-state Markov chains, queueing, dynamic programming, Markov decision processes, reliability, decision analysis, and simulation. Both theory and applications are stressed. Includes Honors sections. *Preq:* MATH 4000.
- MATH 4420\* Advanced Mathematical Programming 3 (3)** Theory, methodology, and applications of integer and nonlinear programming. Topics include model development, computer solutions, branch and bound, unconstrained and constrained optimization algorithms, complexity and convergence analysis. Case studies are included. *Preq:* MATH 4400.
- MATH 4500 Introduction to Mathematical Models 3 (3)** Includes a study of the modeling process and examples of existing models chosen from physical, biological, social, and management sciences, depending on the instructor. Written and oral report is required for at least one of the models studied. May be repeated for a maximum of six credits. *Preq:* MATH 3600 or MATH 3650; and one of MATH 3020 or STAT 2300 or STAT 3090.
- MATH 4530\* Advanced Calculus I 3 (3)** Limits, continuity, and differentiation of functions of one and several variables, the Riemann integral, and vector analysis. Includes Honors sections. *Preq:* MATH 2060.
- MATH 4540\* Advanced Calculus II 3 (3)** Continuation of MATH 4530. Transformations, multiple integrals, line and surface integrals, infinite sequences and series, and improper integrals. Includes Honors sections. *Preq:* MATH 4530.

**MATH 4550\* Topics in Geometry 3 (3)** Covers a variety of geometries, such as Euclidean, hyperbolic, projective, and spherical. The intrinsic properties of these spaces, such as their geodesics and isometries, are studied. Other topics include differential geometry of curves and surfaces, Gaussian curvature, and the celebrated Gauss-Bonnet theory linking geometry with topology. *Preq:* MATH 2060 and MATH 3110; and either MATH 1190 or MATH 3190.

**MATH 4560\* Topology 3 (3)** Introduction to point-set topology. Topics include metric spaces, topological spaces, Hausdorff spaces, homeomorphisms, continuity, product and quotient spaces, compactness, and connectedness. Additional topics, such as homotopy equivalence of paths, the fundamental group, and basic knot theory, are introduced as time permits. *Preq:* MATH 1190 or MATH 3190.

**MATH 4600\* Introduction to Numerical Analysis I 3 (3)** Introduction to the problems of numerical analysis emphasizing computational procedures and application. Topics include sources of error and conditioning, matrix methods, systems of linear equations, nonlinear equations, interpolation and approximation by splines, polynomials, and trigonometric functions. *Preq:* MATH 2060 or MATH 2070; and MATH 3600 or MATH 3650.

**MATH 4630\* Mathematical Analysis I 3 (3)** Basic properties of the real number system, sequences and limits; continuous functions, uniform continuity and convergence. Integration, differentiation, functions of several real variables, implicit function theory. Includes Honors sections. *Preq:* MATH 2060.

**MATH 4810 Seminar in Mathematics 1-3 (1-3)** Attention is focused on mathematical areas in which nonroutine problems can be posed with comparative ease. Emphasis is on independent study and student use of previously acquired mathematical skills. Open to students by invitation only for a maximum of three credits. *Preq:* Consent of instructor.

**MATH 4820 Undergraduate Research 3 (3)** Independent research conducted under the supervision and guidance of a faculty member. May be repeated for a maximum of six credits. Includes Honors sections.

**MATH 4910 Independent Study 3 (3)** Independent study or internship in mathematical sciences under faculty supervision. A written report and oral poster presentation of the results of the independent study or internship are required. May be repeated for a maximum of six credits.

**MATH 4920 Professional Development 1 (1)** Issues in professional development in the Mathematical Sciences. Individual portfolios are evaluated and critiqued for continued career use. To be taken Pass/No Pass only.

**MATH 4990 Creative Inquiry—Mathematical Sciences 1-3 (1-3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of three credits. *Preq:* Consent of faculty member/mentor.

## MECHANICAL ENGINEERING

*Professors:* D.E. Beasley, S.B. Biggers, G.M. Fadel, R.S. Figliola, M. Grujicic, P.F. Joseph, J.M. Ochterbeck, M. Ramasubramanian, *Chair;* J.R. Saylor, J.D. Summers, C. Tong, J.R. Wagner, D.A. Zumbrennen; *Associate Professors:* M. Daqaq, G. Li, R.S. Miller, G. Mocko, R. Qiao, L.L. Thompson, A. Vahidi; *Assistant Professors:* I. Battiato, H. Choi, R. Martinez-Duarte, P. Tallapragada, Y. Wang, X. Xuan, H. Zhao; *Senior Lecturer:* J.M. Delhaye; *Lecturers:* N. Coutris, K. Katuri, P. Meyer, T. Schweisinger, A. Som, D. Willoughby.

**ME 2000 Sophomore Seminar 1 (1)** Seminars address the Mechanical Engineering program, the profession, best student practices, and career paths. Invited presenters and faculty provide lectures and demonstrations. *Preq or concurrent enrollment:* ME 2010 with a C or better.

**ME 2010 Statics and Dynamics for Mechanical Engineers 5 (3)** Vector analysis of the effects of forces, couples, and force-systems on rigid bodies. Conditions of static equilibrium for simple structures, including pulleys, trusses, beams, frames. Kinematics and kinetics of general rigid body motion in 2-D. Applications of Newton's laws, energy methods, and impulse momentum methods to simple machine elements. *Preq:* MATH 1060 and MATH 1080 and PHYS 1220 and ENGR 1070 and ENGR 1080, each with a C or better. *Preq or concurrent enrollment:* ENGR 1090 and ENGR 2080 and MATH 2060 and PHYS 1240, each with a C or better. *Coreq:* ME 2011.

**ME 2011 Statics and Dynamics for Mechanical Engineers Laboratory 0 (4)** Non-credit laboratory to accompany ME 2010. *Coreq:* ME 2010.

**ME 2030 Foundations of Thermal and Fluid Systems 3 (3)** Introduction to control volumes, conservation laws of mass, momentum, and energy. Concepts of work and heat are introduced, including rate forms. Properties of pure substances. *Preq:* MATH 2060 and PHYS 2210, each with a C or better. *Preq or concurrent enrollment:* ME 2220 with a C or better.

**ME 2040 Mechanics of Materials 3 (3)** Relationships between external loads on solid bodies or members and the resulting internal effects and dimension changes, including the derivation of rational formulas for stresses and deformations and the identification and use of important mechanical properties of engineering materials. Includes Honors sections. *Preq:* MATH 2060 and ME 2010, each with a C or better. *Preq or concurrent enrollment:* MATH 2080 and ME 2220 and MSE 2100, each with a C or better.

**ME 2220 Mechanical Engineering Laboratory I 2 (6)** Discovery of mechanical engineering principles and phenomena. Introduction to laboratory safety practices, instrumentation, calibration techniques, data analysis, and report writing. Introduction to basic manufacturing processes. *Preq:* PHYS 1220 and PHYS 1240, each with a C or better.

**ME 2900 Creative Inquiry in Mechanical Engineering I 1-3 (1-3)** Students work in extended teams (including sophomores, juniors, seniors, and graduate students) addressing research and development problems under the supervision of a faculty lead. Engineering principles and best practices will be employed. Team work, professionalism, and communication skills are emphasized. May be repeated for a maximum of nine credits. *Preq:* consent of instructor.

**ME 3000 Junior Honors Seminar 0 (0)** Acquaints students enrolled in Departmental Honors Program with current research activities in the Department of Mechanical Engineering. Faculty provide seminars in which research interests are summarized. These seminars are planned to prepare students in choosing a research topic for the senior thesis. *Preq:* Junior standing in departmental honors program.

**ME 3030 Thermodynamics 3 (3)** Study of the second law and entropy. Includes applications to fixed mass systems and control volumes; vapor and gas power cycles; mixtures of gases; vapor psychometrics; combustion and the third law. Thermochemical equilibrium. *Preq:* ME 2030 with a C or better.

**ME 3040 Heat Transfer 3 (3)** Study of steady and transient heat conduction, free and forced convection, radiation, and multi-mode heat transfer. Emphasizes analytical and numerical solutions to engineering heat transfer problems with a design orientation. *Preq:* MATH 2080 and ME 3080 each with a C or better. *Preq or concurrent enrollment:* MATH 3650, with a C or better.

**ME 3050 Modeling and Analysis of Dynamic Systems 3 (3)** Presents techniques for developing and analyzing models of mechanical, electrical, electromechanical, fluid and thermal systems. Transient, steady-state and frequency response are determined using analytical and numerical methods. Covers tools for stability analysis and state-space representation. Covers linear free- and forced-vibrations in single- and multi-degree-of-freedom systems with lumped-parameters representation, methods of vibration absorption and isolations. *Preq:* ECE 2070 and ECE 2080 and MATH 2080 and MATH 3650, each with a C or better. *Preq or concurrent enrollment:* ME 3070 with a C or better.

**ME 3060 Fundamentals of Machine Design 3 (3)** Introduction to failure theory and fatigue analysis. Integration of these topics with selected portions of mechanics of materials and application of them to the design and analysis of machine elements. *Preq:* ME 2040 and ME 3070, each with a C or better.

**ME 3070 Foundations of Mechanical Systems 3 (3)** Introduction to basic physical elements of mechanical engineering systems. Problem solving, design, and resourceful application of mathematics and general principles from students' science courses are emphasized throughout. *Preq:* ME 2010 with a C or better. *Preq or concurrent enrollment:* ME 2040 and ME 2220 each with a C or better.

**ME 3080 Fluid Mechanics 3 (3)** Behavior of fluids at rest or in motion, including the study of fluid properties. Emphasizes a rational, analytical approach from which are developed basic principles of broad applicability to all fields of engineering. Includes Honors sections. *Preq:* ME 2010 and ME 2030, each with a C or better. *Preq or concurrent enrollment:* MATH 2080 with a C or better.

**ME 3100 Thermodynamics and Heat Transfer 3 (3)** Introduction to thermodynamics and heat transfer for non-majors: properties of liquids and gases, first and second law analysis, introduction to cycles for power and refrigeration, heat flow by conduction and radiation, and convective heat flow and heat exchangers. *Preq:* Junior standing in an engineering curriculum other than Mechanical Engineering.

- ME 3120 Manufacturing Processes and Their Application** 3 (3) Fundamental principles associated with production processes and their application to the manufacture of products from metals, polymers, ceramics, and composites. Emphasizes the physical and quantitative aspects of processing, the selection of processes to create products, and the identification processes used to manufacture existing products. *Preq or concurrent enrollment:* ME 3040 and ME 3060 and ME 3330, each with a C or better.
- ME 3330 Mechanical Engineering Laboratory II** 2 (6) Mechanical engineering principles and phenomena are reinforced through student conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* MATH 2080 and ME 2030 and ME 2220, each with a C or better.
- ME 3900 Creative Inquiry in Mechanical Engineering II** 1-3 (1-3) Students work in extended teams (including sophomores, juniors, seniors, and graduate students) addressing research and development problems under the supervision of a faculty lead. Engineering principles and best practices will be employed. Team work, professionalism, and communication skills are emphasized. May be repeated for a maximum of nine credits. *Preq:* Consent of instructor.
- ME 4000 Senior Seminar** 1 (1) Seminars address the problems encountered by engineering graduates in professional practice. Invited lecturers as well as faculty provide the lectures and demonstrations. Students must have completed all required 3000-level ME courses before enrolling in this course.
- ME 4010 Mechanical Engineering Design** 3 (3) Project-oriented course in mechanical engineering emphasizing the role of analysis, synthesis, and evaluation in design and on written reporting of design solutions. Influence of economics and optimization, concurrent development, integration of design and manufacturing, and system creation are utilized for engineering design decisions. *Preq:* ENGL 3140 and ME 3030 and ME 3040 and ME 3050 and ME 3060, each with a C or better (concurrent enrollment in one of the preceding ME courses is permitted, but student must request a prerequisite override from the undergraduate coordinator). *Preq or concurrent enrollment:* ME 3120 with a C or better.
- ME 4020 Internship in Engineering Design** 3 (1) Creative application of general engineering knowledge in solving an open-ended design problem provided by a sponsor typically external to the University. Progress is evaluated by a faculty jury. Students present results to the jury and sponsor through written reports and oral presentations addressing University written/oral competency goals. Students must have completed all required 3000-level ME courses before enrolling in this course. *Preq:* ME 4010 with a C or better. *Coreq:* ME 4021.
- ME 4021 Internship in Engineering Design Laboratory** 0 (3) Non-credit laboratory to accompany ME 4020. *Coreq:* ME 4020.
- ME 4030 Control and Integration of Multidomain Dynamic Systems** 3 (3) Introduction of control theory with sensor, actuator, and dynamic plant integration to develop, model, control, and analyze mathematical models of dynamics systems, including mechanical, electrical, electromechanical, hydraulic and pneumatic systems. Transient dynamics are determined using analytical and numerical methods with feedback control systems. Strong emphasis is placed on system design using computer simulation tools. *Preq:* ME 3050 with a C or better.
- ME 4050 Kinematics and Dynamics of Machinery I** 3 (3) Graphical, analytical, and numerical techniques are used in the dynamic analysis and synthesis of machines. Emphasis is on the application of these analysis techniques to planar linkages. *Preq:* ME 2040 and ME 3070, each with a C or better.
- ME 4070\* Applied Heat Transfer** 3 (3) Application oriented extension of ME 3040, considering topics in transient conduction, flow of fluids, energy exchange by radiation, and mass transfer. Applications in heat-exchanger design with emphasis on economics and variation of operating conditions from the design point. *Preq:* ME 3040 with a C or better.
- ME 4150 Undergraduate Research** 1-3 (1-3) Individual research projects conducted under the direct supervision and guidance of a faculty member. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Consent of instructor.
- ME 4160 Control of Mechanical Systems** 3 (3) Physical modeling and feedback principles are presented for control of mechanical systems. Transient response, root locus, and frequency response principles are applied to the control of basic mechanical systems such as electric motors, fluid tanks, or thermal processes. PID control laws are emphasized. *Preq:* ME 3050 with a C or better.
- ME 4170\* Mechatronics System Design** 3 (2) Mechatronics integrates control, sensors, actuators, and computers to create a variety of electromechanical products. Includes concepts of design, appropriate dynamic system modeling, analysis, sensors, actuating devices, and real time microprocessor interfacing and control. Laboratory experiments, simulation, and design projects are used to exemplify the course concepts. *Preq:* ME 3050 with a C or better. *Coreq:* ME 4171.
- ME 4171\* Mechatronics System Design Laboratory** 0 (3) Non-credit laboratory to accompany ME 4170. *Coreq:* ME 4170.
- ME 4180 Finite Element Analysis in Mechanical Engineering Design** 3 (2) Introduction to the finite element method and solid modeling, finite element modeling and analysis using commercial codes; analysis strategies using finite elements; applications to heat transfer, fluid flow, and structures. *Preq:* ME 2040 and ME 3040 and ME 3080, each with a C or better. *Coreq:* ME 4181.
- ME 4181 Finite Element Analysis in Mechanical Engineering Design Laboratory** 0 (1) Non-credit laboratory to accompany ME 4180. *Coreq:* ME 4180.
- ME 4200\* Energy Sources and Their Utilization** 3 (3) Covers availability and use of energy sources such as fossil fuels, solar (direct and indirect), and nuclear; addresses energy density and constraints to use (technical and economic) for each source. *Preq:* ME 3030 and ME 3040, each with a C or better.
- ME 4210\* Introduction to Compressible Flow** 3 (3) Introductory concepts to compressible flow; methods of treating one-dimensional gas dynamics including flow in nozzles and diffusers, normal shocks, moving and oblique shocks, Prandtl-Meyer Flow, Fanno Flow, Rayleigh Flow, and reaction propulsion systems. *Preq:* ME 3030 and ME 3080, each with a C or better.
- ME 4220\* Design of Gas Turbines** 3 (3) Guiding principles in gas turbine cycles are reviewed. Turbine and compressor design procedures and performance prediction for both axial and radial flow machines are presented. Methods of design of rotary heat-exchangers and retrofitting gas turbine for regenerative operation are presented. Design projects are used to illustrate the procedures. *Preq:* ME 3080 with a C or better.
- ME 4230\* Introduction to Aerodynamics** 3 (3) Basic theories of aerodynamics are presented for the purpose of accurately predicting the aerodynamic forces and moments which act on a vehicle in flight. *Preq:* ME 3080 with a C or better.
- ME 4260\* Nuclear Energy** 3 (3) Engineering methods and science principles are considered for the design of components to nuclear power stations. A systems level understanding is emphasized. Includes nuclear fuel cycle and regulatory considerations. *Preq:* ME 3030 and ME 3040, each with a C or better.
- ME 4290\* Thermal Environmental Control** 3 (3) Mechanical vapor compression refrigeration cycles, refrigerants, thermoelectrical cooling systems, cryogenics, thermodynamic properties of air, psychometric charts, heating and cooling coils, solar radiation, heating and cooling loads, insulation systems. *Preq:* ME 3030 and ME 3080, each with a C or better.
- ME 4300\* Mechanics of Composite Materials** 3 (3) Develops fundamental relationships for predicting the mechanical and thermal response of multi-layered materials and structures. Develops micro-mechanical and macromechanical relationships for laminated materials emphasizing continuous filament composites. Discusses the unique nature of composites and the advantages of designing with composites. *Preq:* ME 2040 with a C or better.
- ME 4310 Applied Fluids Engineering** 3 (3) Applications-oriented course in industrial fluids engineering, primarily directed toward the analysis and design of piping systems and components for liquid and gas flow. Topics include friction factors, head loss, flow capacities, piping networks, flow measurement, pumps, control valves, and hydraulic and pneumatic components. *Preq:* ME 3080 and ME 3330, each with a C or better.
- ME 4320\* Advanced Strength of Materials** 3 (3) Topics in strength of materials not covered in ME 3020. Three-dimensional stress and strain transformations, theories of failure, shear center, unsymmetrical bending, curved beams, and energy methods. Other topics such as stress concentrations and fatigue concepts are treated as time permits. *Preq:* ME 2040 with a C or better.

**ME 4400 Materials for Aggressive Environments** 3 (3) Emphasizes the engineering aspects of selecting materials for applications in aggressive environments. Various types of materials degradation are discussed as are methods for wastage prevention, including especially engineering design and materials selection approaches. Structural metallic alloys are emphasized; however, technically important ceramics and polymers are also discussed. *Preq:* ME 3060 with a C or better.

**ME 4440 Mechanical Engineering Laboratory III** 2 (6) Continuation of ME 3330. Mechanical engineering principles and phenomena are reinforced through student-conducted experiments. Presentation of fundamentals of instrumentation, calibration techniques, data analysis, and report writing in the context of laboratory experiments. *Preq:* ME 3330; and MATH 3020 or STAT 4110, each with a C or better. *Preq or concurrent enrollment:* ME 3060 with a C or better.

**ME 4530\* Dynamic Performance of Vehicles** 3 (3) Introduces techniques for analyzing the dynamic behavior of vehicles. Types of vehicles to be considered are chosen from aircraft, surface ships, automobiles and trucks, railway vehicles, and magnetically levitated vehicles. *Preq:* ME 3050 with a C or better.

**ME 4540\* Design of Machine Elements** 3 (3) Design of common machine elements including clutches, brakes, bearings, springs, and gears. Optimization techniques and numerical methods are employed as appropriate. *Preq:* ME 3060 with a C or better.

**ME 4550\* Design for Manufacturing** 3 (3) Concepts of product and process design for automated manufacturing are considered. Topics include product design for automated manufacturing, inspection and assembly, using automation, industrial robots, knowledge-based systems and concepts of flexible product manufacture. *Preq:* ME 3060 with a C or better. *Preq or concurrent enrollment:* ME 3120 with a C or better.

**ME 4570\* Fundamentals of Wind Power** 3 (3) Introduces wind turbine systems, including wind energy potential and application to power generation. Topics include wind energy principles, wind site assessment, wind turbine components, power generation machinery control systems, connection to the electric grid, and maintenance. May also be offered as ECE 4570. *Preq:* ECE 2070 or ECE 3200, with a C or better.

**ME 4710\* Computer-Aided Engineering Analysis and Design** 3 (2) Students are exposed to geometric and solid modeling, finite elements, optimization, and rapid-prototyping. Students design an artifact, represent it on the computer, analyze it using FEA, then optimize before prototyping it. Emphasizes the use of computer-based tools for engineering design. *Preq:* ENGR 1090 and ME 3070, each with a C or better. *Coreq:* ME 4711.

**ME 4711\* Computer-Aided Engineering Analysis and Design Laboratory** 0 (3) Non-credit laboratory to accompany ME 4710. *Coreq:* ME 4710.

**ME 4900 Creative Inquiry in Mechanical Engineering III** 1-3 (1-3) Students work in extended teams (including sophomores, juniors, seniors, and graduate students) addressing research and development problems under the supervision of a faculty lead. Engineering principles and best practices will be employed. Team work, professionalism, and communication skills are emphasized. May be repeated for a maximum of nine credits. *Preq:* Consent of instructor.

**ME 4930\* Selected Topics in Mechanical Engineering** 1-6 (1-6) Study of topics not found in other courses. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

## MANAGEMENT

*Professors:* L.D. Fredendall, V. Grover, M.A. McKnew, A.V. Roth, P.L. Roth, V. Sridharan, *Chair; Associate Professors:* P.T. Gianiodis, J. Miller, R.L. Purvis, T.L. Robbins, W.H. Stewart Jr., J.B. Thatcher, T.J. Zagenezky; *Assistant Professors:* Y. B. Ferrand, A.E. Ingram, G. Ozkan, R. Raman, J.W. Ridge, K.D. Scott, S. Wang; *Senior Lecturer:* S.E. Yoder *Lecturers:* J.K. Bilbrey, K.D. Clark, M.A. Cole, J.E. Hopkins, Z. Lefkakis, H. Li, H. Sun, M.M. Ward

**MGT 2010 Principles of Management** 3 (3) Management's role as a factor of economic production. Functions of management, principles of organization, and behavior in organizations. Includes Honors sections.

**MGT 2180 Mgt Pc Applications** 3 (6) Personal computer applications that support managers. Students learn from hands-on work rather than lecture.

**MGT 2970 Creative Inquiry—Management** 1-3 (1-3) Students plan, develop, and execute a research project related to the field of management and present their findings. The development of the project includes lectures about research design, conduct, and data analysis. May be repeated for a maximum of six credits. Includes Honors sections.

**MGT 3050 Economics of Transportation** 3 (3) Topics include history and structure of transportation systems in the United States, the nature of transportation costs and rates, transportation systems as factors in industrial location, transportation policy, and the role of transportation in national security. *Preq:* Junior standing.

**MGT 3060 Managerial Economics** 3 (3) Uses tools of economic analysis in classifying problems in organizing and evaluating information, and in comparing alternative courses of action. Bridges the gap between economic theory and managerial practices. May not be used to satisfy requirements for a degree in Economics. May also be offered as ECON 3060. *Preq:* ECON 2110.

**MGT 3070 Human Resource Management** 3 (3) Principles, concepts, and techniques concerned with effective and efficient utilization of personnel. Emphasizes motivation, leadership, and human behavior related to employer-employee relations. Topics include personnel recruitment, classification, selection, training, development, and performance evaluation. Includes Honors sections. *Preq:* STAT 3090 or equivalent (IE 3610 or MATH 3020 or PSYC 3090).

**MGT 3100 Intermediate Business Statistics** 3 (3) Quantitative methods of the management scientist with applications to business and industrial problems. Topics include regression analysis, correlation analysis, analysis of variance, sampling, and nonparametric methods. Includes Honors sections. *Preq:* STAT 3090 or equivalent (IE 3610 or MATH 3020 or PSYC 3090); and MGT 2180 or equivalent (CPSC 2200).

**MGT 3120 Decision Models for Management** 3 (3) Exploration of ways in which management science decision models can help in making sound managerial decisions. Problem solving is Excel-based. Topics include linear programming, project scheduling, and simulation. Includes Honors sections. *Preq:* STAT 3090 or equivalent (IE 3610 or MATH 3020 or PSYC 3090); and MGT 2180 or equivalent (CPSC 2200).

**MGT 3150 New Venture Creation** 3 (3) Through the development of a business plan, the course focuses on creating an organization capable of effectively exploiting a viable opportunity. Topics include organization strategy and design, start-up capital, operations and sourcing issues, leadership, team building, and management of rapid growth. May also be offered as ELE 3150. *Preq:* ELE 3010.

**MGT 3170 Logistics Management** 3 (3) Management of physical distribution and supply systems with emphasis on design concepts, cost determinants, and control. *Preq:* MGT 3120.

**MGT 3180 Management of Information Systems** 3 (3) Introduction to information systems concepts and applications in business. Topics include software, hardware, decision support and knowledge based systems, database, information systems design and implementation, and the management of information systems. *Preq:* MGT 2010.

**MGT 3900 Operations Management** 3 (3) Examines the role of operations management in both manufacturing and service organizations. Discusses the concepts, tools, and techniques for managing the operations function. Topics include operations strategy, design, planning, and control. *Preq:* STAT 3090 or equivalent (IE 3610 or MATH 3020 or PSYC 3090); and MGT 2180 or equivalent (CPSC 2200).

**MGT 3980 Internship in Management** 1-3 (1-3) Faculty-supervised management internship to give students learning opportunities that support their classroom experiences. Requires at least 150 hours of internship work per credit hour received. Course enrollment and internship must occur in the same semester. May be repeated for a maximum of three credits. To be taken Pass/No Pass only. *Preq:* Junior standing and a 2.0 cumulative grade-point average and consent of instructor.

**MGT 4000 Management of Organizational Behavior** 3 (3) Provides management students with a framework for understanding how behavior within business organizations is managed. Particular emphasis is on integrating management theory with recent developments in the behavioral sciences with distinct management applications. Theory, research, and business applications are considered. *Preq:* MGT 2010.



- MGT 4020 Operations Planning and Control 3 (3)** Managing, planning, and controlling production and service operations emphasizing demand forecasting, aggregate planning, production scheduling, and inventory management. Includes Honors sections. *Prq:* MGT 3900.
- MGT 4030 Special Problems 1-3 (1-3)** Students plan, develop, and execute a research project related to the field of management and defense studies. May be repeated for a maximum of six credits. *Prq:* Senior standing in Management.
- MGT 4040 Advanced Statistical Quality Control 3 (3)** Statistical quality control techniques as applied to all areas of quality control: process control, process capability, acceptance sampling, and economic aspects of quality decisions. *Prq:* MGT 3900.
- MGT 4080 Lean Operations 3 (3)** Examines the use of scientific methods for the design of operating systems for both manufacturing and services. Special emphasis is on the development of the Toyota Production System for continuous improvement and the application of the relevant techniques to the design of facilities, jobs, and systems. *Prq:* MGT 3900.
- MGT 4110 Project Management 3 (3)** Examination and application of the project management body of knowledge. This consists of theory, tools, and techniques to organize, plan, and control individuals, teams, quality, and operations while conducting a project. *Prq:* STAT 3090 or equivalent, (IE 3610 or MATH 3020 or PSYC 3090).
- MGT 4120 Sourcing and Supplier Management 3 (3)** Provides an understanding of the key issues in selecting and developing suppliers. Provides a conceptual framework to understand purchasing's function within the firm and its role in supply chain management. *Prq:* MGT 3900.
- MGT 4150 Business Strategy 3 (3)** Capstone course for seniors. Various methods are used in analyzing complex business problems, requiring students to integrate their knowledge of all areas of business. Student participation and written and oral communications are stressed. Includes Honors sections. Students must take this course at Clemson University. *Prq:* FIN 3060 or 3110; and MGT 2010; and MKT 3010; and Senior standing.
- MGT 4160 Special Topics in Human Resources 3 (3)** In-depth examination of advanced topics in Human Resource Management based on the developments in the Human Resource profession and interests of faculty. Emphasizes the strategic formulation and application of these topics to support organizational leadership. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* MGT 3070 and MGT 4000.
- MGT 4220 Small Business Management 3 (3)** Study of management of the small independently owned and operated business. Emphasizes analyzing new business opportunities, planning and establishing a growing concern, and managing the contemporary small business. Field experience in consulting with small businesses enhances students understanding of the unique opportunities and problems of small business organizations. *Prq:* MKT 3010.
- MGT 4230 International Business Management 3 (3)** Survey of theoretical and institutional complexities of international business operations. Topics include exporting, importing, foreign investment, multinational corporations, and international payment system. *Prq:* Junior standing.
- MGT 4240 Global Supply Chain Management 3 (3)** Design, planning, control, and improvement of supply chains for competing effectively in the context of global operations. Topics include supply chain structure and configuration, approaches to intra-organizational and inter-firm integration, and complexities of material, information, and cash flows across international borders. *Prq:* MGT 3900.
- MGT 4250 Compensation Management 3 (3)** Examination of compensation employees seek in exchange for their efforts and contributions. Topics include government and union influences; job content analysis, description, and evaluation; developing pay structures; measuring and paying for performance; employee benefits; administration of the compensation plan; executive, managerial, professional, and sales. *Prq:* MGT 3070 and MGT 4000.
- MGT 4270 Managing Continuous Improvement 3 (3)** Examination of issues related to continuous improvement, including a systematic approach to selecting improvement areas, determining how to improve, plan, and manage the improvement process. Topics include selecting performance measurements, using teams to achieve breakthrough change, identifying root causes of problems, and developing and implementing solutions to problems. *Prq:* MGT 3900.
- MGT 4300 Senior Seminar in Management 3 (3)** In-depth study of current business topics; allows senior Management students to relate their academic studies to real-world problems. Senior paper is required. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* Senior standing.
- MGT 4310 Employee Diversity, Rights, and Responsibilities 3 (3)** Focuses on employee and organizational rights and responsibilities. Topics include various types of discrimination (race, sex, religion, national origin, age, and disability status); drug and alcohol testing; AIDS in the workplace; employee discipline and termination issues; privacy and safety concerns; and union organizing campaigns. *Prq:* MGT 3070 or MGT 4000.
- MGT 4350 Personnel Interviewing 3 (3)** Helps students understand current interviewing theory, conduct an employment interview, and advise their future employers how to improve interviewing programs. Topics include job analysis, legal issues, types of interviews, and evaluating applicants. *Prq:* MGT 3070 or MGT 4000.
- MGT 4360 White-Collar Crime 3 (3)** White-collar crime and corruption are examined from a managerial perspective. Topics include financial crimes, crimes against consumers, environmental crimes, acts of institutional corruption, the impact of organized crime on legitimate businesses, and computer crime. *Prq:* Senior standing. *Prq or concurrent enrollment:* FIN 3060.
- MGT 4400 Negotiations 3 (3)** Focuses on principles and practice in business negotiations. Topics include negotiating concepts, strategies, situational applications, and practice in applied techniques. Situations include negotiation in sales, customer relations, global nuances in negotiation situations, employee management, and career development. *Prq:* Senior standing.
- MGT 4440 International Perspectives in Industrial Management 1-6 (1-6)** Provides an international perspective to industrial management via organized plant visits to businesses in a foreign country and lectures by and discussions with senior operations managers. Cultural visits and lectures are also organized to provide a holistic perspective to cover cultural and economic environment of the host country. Students are responsible for travel costs. May be repeated for a maximum of six credits. May also be offered as IE 4440. *Prq:* Consent of instructor.
- MGT 4520 Business Analysis 3 (3)** Follows the traditional systems development life cycle (SDLC), although alternative methodologies are also discussed. Focuses on earlier phases of the SDLC, from IS planning through specification of structured requirements and on the methods, techniques, and tools used to determine information requirements and their unambiguous documentation. *Prq:* MGT 3180; or MGT 2010 and ACCT 3220; or MGT 2010 and CPSC 2150 and CPSC 2310.
- MGT 4540 Systems Implementation 3 (3)** Builds upon skills of programming, database, and systems analysis and design by involving students with the later phases of the systems development life cycle (SDLC). Students design and develop a system using various platforms. Focus is on the logical and physical system design. *Prq:* CPSC 4620 or MGT 4520.
- MGT 4550 Emerging Information Technology Trends in Business 3 (3)** In-depth study, through case studies, readings, and hands-on experience, of emerging information technologies in and across business organizations. Focuses on understanding, effective deployment, and impact of these technologies on business outcomes. *Prq:* MGT 3180; or MGT 2010 and ACCT 3220; or MGT 2010 and CPSC 2150 and CPSC 2310.
- MGT 4560 Business Information Management 3 (3)** In-depth study of business related data, information, and knowledge-based systems as well as business intelligence technologies and techniques, through readings, hands-on experience, and case studies. Emphasizes organizational decision-making and the ability to access data, information and knowledge-based assets where and when needed. *Prq:* MGT 3180; or MGT 2010 and ACCT 3220; or MGT 2010 and CPSC 2150 and CPSC 2310.
- MGT 4900 Selected Topics in Industrial Management 3 (3)** In-depth examination of advanced topics in Industrial Management. Topics may vary in keeping with developments in the management profession and interests of faculty. Emphasizes the application of these topics to the production and operations management environment. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* MGT 4020 or 4040 or 4080.

**MGT 4970 Creative Inquiry—Management 1-3** (1-3) Students plan, develop, execute, and direct a research project related to the field of management and present their findings. The project includes lectures about research design, conduct, and data analysis. May be repeated for a maximum of six credits. Includes Honors sections.

## MICROBIOLOGY

*Professors:* T.A. Hughes, X. Jiang, C.D. Rice, S.W. Scott; *Associate Professor:* J.M. Henson, Y. Wei; *Assistant Professors:* B.J. Campbell, M. Cao, H.D. Kurtz, T.L. McNealy, T.R. Tzeng; *Senior Lecturers:* J.G. Abercrombie, K.B. Rudolph; *Lecturer:* K.J. Whitehead

**MICR 1010 Microbes and Human Affairs 1** (1) Introduces Microbiology majors to University career and library services, evaluation of computer program proficiency, Web page development, Microbiology emphasis areas, and Microbiology faculty. Students initiate their own Web-based student portfolios, which showcase their skills and experiences (e.g., résumés, accomplishments, and work samples) during their undergraduate programs. *Preq* or *concurrent enrollment:* BIOL 1030 and BIOL 1050; or BIOL 1100.

**MICR 2050 Introductory Microbiology 4** (3) Basic concepts of microbiology, introduced through classroom and laboratory experiences. Emphasizes practical applications in various areas of importance to man. Recommended for students not majoring in a biological science. Not open to Microbiology majors. *Preq:* CH 1010 and CH 1020 and BIOL 1030 and BIOL 1050. *Coreq:* MICR 2051.

**MICR 2051 Introductory Microbiology Laboratory 0** (3) Non-credit laboratory to accompany MICR 2050. *Coreq:* MICR 2050.

**MICR 3050 General Microbiology 4** (3) Morphology, physiology, classification, distribution, and cultivation of microorganisms. *Preq:* Introductory biology coursework, CH 1010 and CH 1020. *Coreq:* MICR 3051.

**MICR 3051 General Microbiology Laboratory 0** (3) Non-credit laboratory to accompany MICR 3050. *Coreq:* MICR 3050.

**MICR 3940 Selected Topics in Creative Inquiry I 2-3** (2-3) Disciplinary and multidisciplinary group research projects with the goal of developing the students' ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include MICR 3940, MICR 4940 or both. Includes Honors sections. *Preq:* Consent of instructor. *Coreq:* MICR 3941.

**MICR 3941 Selected Topics in Creative Inquiry I Laboratory 0** (3-6) Non-credit laboratory to accompany MICR 3940. *Coreq:* MICR 3940.

**MICR 4000\* Public Health Microbiology 3** (3) Epidemiology of transmissible diseases including pathogenic characteristics of the infectious organism, modes of transmission, mechanism of infection, diagnostic aids, effective treatments, immunizing procedures, and methods of preventing infection. Includes Honors sections. *Preq:* MICR 3050.

**MICR 4010\* Microbial Diversity and Ecology 3** (3) In-depth survey of microbial morphology, ecology, and diversity. Study of the interaction and adaptation of microbes in a wide range of environmental conditions, including consideration of their metabolism, nutrition, growth and the use of microbiological assays. Includes Honors sections. *Preq:* CH 2010 or CH 2230; and CH 2270; and MICR 3050.

**MICR 4020\* Environmental Microbiology 3** (3) Discussion of microorganisms in air, terrestrial, and aquatic environments and how they are used for environmental restoration activities. Topics include the nature of biofilms, interactions of microbes with inorganic and organic constituents, processes to implement bioremediation in surface/subsurface environments, and treatment of solid, liquid, and gaseous waste streams. *Preq:* MICR 3050 and MICR 4010; and either CH 2010; or both CH 2230 and CH 2270.

**MICR 4030\* Marine Microbiology 3** (2) Discussion of the microbes that inhabit the marine environment, their peculiar physiological traits, and contributions to the ecology of oceans. *Preq:* MICR 3050; and either CH 2010; or both CH 2230 and CH 2270. *Coreq:* MICR 4031.

**MICR 4031\* Marine Microbiology Laboratory 0** (3) Non-credit laboratory to accompany MICR 4030. *Coreq:* MICR 4030.

**MICR 4050\* Advanced Microbial Ecology of Humans 3** (3) Investigation of the complex ecological relationships between microbes and their human hosts, including investigation of the normal microbial community in various body systems, factors that change the microbiota, and the role of the microbiota in normal development, health and disease of the host. *Preq:* MICR 4010 with a grade of C or better.

**MICR 4070\* Food and Dairy Microbiology 4** (3) Physical-chemical factors limiting survival and growth of microorganisms during processing and manufacturing of food and dairy products. Standard methods for enumerating and identifying indicator bacteria, yeasts, molds, and microbes producing food and food-borne illness. Starter cultures, fungal toxins, microbial cell injury and standards for food and dairy products. Includes Honors sections. *Preq:* MICR 3050; and one of BCHM 3050 or CH 2010 or CH 2230. *Coreq:* MICR 4071.

**MICR 4071\* Food and Dairy Microbiology Laboratory 0** (3) Non-credit laboratory to accompany MICR 4070. *Coreq:* MICR 4070.

**MICR 4100\* Soil Microbiology 3** (3) Role of microorganisms in the decomposition of organic substances, transformation of nitrogen and mineral substances in the soil; interrelationships between higher plants and microorganisms; importance of microorganisms in soil fertility. Includes Honors sections. *Preq:* MICR 4010.

**MICR 4110\* Pathogenic Bacteriology 3** (3) Study of pathogenic bacteria and their virulence mechanisms. Emphasizes host-microbe interactions, responses to infection and treatment, and research strategies for various topics of bacterial pathogenesis. Includes Honors sections. *Preq:* MICR 3050 and MICR 4120 and MICR 4140.

**MICR 4120\* Bacterial Physiology 3** (3) Consideration of the cytology, physiology, metabolism, and genetics of bacteria. Includes studies of growth and death, reproduction and mutation, nutrition and metabolic pathways, regulatory mechanisms, and effects of environment. Includes Honors sections. *Preq:* CH 2240 and MICR 3050; and either BCHM 3010 or BCHM 3050.

**MICR 4130\* Industrial Microbiology 3** (2) Microbial aspects of large-scale processes for the production of foods, antibiotics, enzymes, fine chemicals, and beverages. Topics include strain selection, culture maintenance, biosynthetic pathways, continuous cultivation and production of single cell protein. Includes Honors sections. *Preq:* MICR 3050. *Coreq:* MICR 4131.

**MICR 4131\* Industrial Microbiology Laboratory 0** (3) Non-credit laboratory to accompany BIOL 4130. *Coreq:* MICR 4130.

**MICR 4140\* Basic Immunology 3** (3) Introduction to the immune system of vertebrate animals, with an emphasis on structure, function, regulation, and cellular and molecular mechanisms of immune responses. Includes Honors sections. May also be offered as AVS 4140 or BIOL 4140. *Preq:* BIOL 4610 and MICR 3050.

**MICR 4150\* Microbial Genetics 3** (3) Investigates the molecular basis of microbial lives. Topics include essential genes involved in DNA, RNA and protein metabolism; mutations and genome evolution; global gene regulation; and genetic analysis, using both forward and reverse genetics. Includes Honors sections. *Preq:* MICR 4120; and BCHM 3010 or BCHM 3050. Non-Microbiology majors do not have to have taken MICR 4120, but must request a registration override from the instructor to enroll in this course.

**MICR 4160\* Introductory Virology 3** (3) Introduction to the field of virology, including animal, bacterial, and plant viruses. Topics include nomenclature and classification, biochemical and biophysical characteristics, mechanisms of replication, chemotherapy, and techniques for isolation, assay, and purification. Includes Honors sections. *Preq:* MICR 3050; and either BCHM 3010 or BCHM 3050.

**MICR 4170\* Cancer and Aging 3** (3) Discusses alterations that occur at molecular, cellular and tissue levels during cell transformation and aging. Topics include the cell division cycle, signal transduction pathways, oncogenes and tumor suppressors, cell death and cell aging. Includes Honors sections. *Preq:* MICR 3050 and BIOL 4610; and either BCHM 3010 or 3050.

**MICR 4190\* Selected Topics in Molecular Medicine 3** (3) Introduction to various areas of molecular medicine. Examines the latest research and developments in molecular medicine. Designed for students interested in medicine and biomedical research. Graduate students may repeat for a maximum of six credits. *Preq:* BCHM 3010 or BCHM 3050 or MICR 3050.

**MICR 4210 Pathogenic Bacteriology Laboratory I** (3) Complements the pathogenesis research topics covered in the pathogenic bacteriology lecture. These topics are important at practical levels for prevention and treatment of bacterial diseases. Laboratory is used to teach pathogen handling, basic identification techniques, and modern molecular protocols for pathogen identification. *Preq:* MICR 4140. *Preq or concurrent enrollment:* MICR 4110.

**MICR 4220 Bacterial Physiology Laboratory I** (3) Laboratory topics corresponding to MICR 4120 lecture. The course will train students in the proper handling of bacteria and will teach techniques for growing and maintaining bacterial cultures while avoiding contamination. *Preq or concurrent enrollment:* MICR 4120.

**MICR 4240\* Immunology Laboratory I** (3) This course is designed to apply the knowledge gained in MICR 4140, Immunology lecture, in an applied setting. The experiments in this beginning immunology laboratory are designed to study both the innate and acquired immune systems. Experimentation into the formation, function and detection of antibodies provides students with skills in basic immunologic techniques. May also be offered as AVS 4240 or BIOL 4240. *Preq or concurrent enrollment:* MICR 4140.

**MICR 4250\* Microbial Genetics Laboratory I** (3) Complements the genetics topics covered in the Microbial Genetics lecture. These topics are important at practical levels for molecular and genetics studies. The laboratory is used to teach basic cloning techniques, the basis of blue/white screening, isolation of mutants, calculation of mutation rate, as well as gene regulation. *Preq or concurrent enrollment:* MICR 4150.

**MICR 4270\* Cancer and Aging Laboratory I** (3) The laboratory is used to teach the basic molecular protocols for cancer and aging research, and will help students to understand the mechanisms of cancer and aging discussed in lecture. *Preq or concurrent enrollment:* MICR 4170.

**MICR 4300\* Soil Microbiology Laboratory I** (3) Examines microbes residing in the soil and their effects on the soil substratum and resident plant communities. Topics include biogeochemistry, microbial isolation, microcosm development, and characterization of soil microbial communities. *Preq or concurrent enrollment:* MICR 4100.

**MICR 4310 Microbial Diversity and Ecology Laboratory I** (3) Provides a laboratory experience to complement topics covered in the Microbial Diversity and Ecology lecture. These topics are important at practical levels to better understand the diversity of microbes in various ecosystems. The laboratory is used to learn sampling techniques, preparation of microbial media, basic identification techniques, and modern molecular protocols for microbe identification, such as PCR and 16S rDNA gene sequencing. *Preq or concurrent enrollment:* MICR 4010.

**MICR 4500 Advanced Microbiology Laboratory I** 2 (1) Application of knowledge and techniques learned in the Introductory Microbiology Lab with new topics on microbial ecology, diversity and physiology. Experiments in soil, marine and environmental microbiology will be conducted. *Preq:* MICR 4010. *Coreq:* MICR 4501.

**MICR 4501 Advanced Microbiology Laboratory I Laboratory 0** (2) Non-credit laboratory to accompany MICR 4500. *Coreq:* MICR 4500.

**MICR 4510 Advanced Microbiology Laboratory II** 2 (1) Application of knowledge and techniques learned in the Advanced Microbiology Lab I with new topics in microbial cell biology and microbial genetics. *Preq:* MICR 4120 and MICR 4500. *Coreq:* MICR 4511.

**MICR 4511 Advanced Microbiology Laboratory II Laboratory 0** (2) Non-credit laboratory to accompany MICR 4510. *Coreq:* MICR 4510.

**MICR 4520 Advanced Microbiology Laboratory III** 2 (1) Application of knowledge and techniques learned in the Advanced Microbiology Labs I and II with new topics on pathogenic bacteriology, parasitology, virology and immunology. *Preq:* MICRO 4510. *Coreq:* MICR 4521.

**MICR 4521 Advanced Microbiology Laboratory III Laboratory 0** (2) Non-credit laboratory to accompany MICR 4520. *Coreq:* MICR 4520.

**MICR 4560\* Medical and Veterinary Parasitology 3** (3) Introduction to parasitism in the animal kingdom. Emphasizes basic and applied principles related to economically and medically important diseases. Classical and experimental approaches to the study of parasitism are examined in reference to protozoa, helminths, and arthropods. Includes Honors sections. May also be offered as BIOL 4560. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* MICR 4570.

**MICR 4570\* Medical and Veterinary Parasitology Laboratory 2** (1) Laboratory to reinforce material presented in BIOL 4560. Introduces students to both live and preserved human/animal parasites. Also introduces techniques used in collection, preservation, and examination of animal parasites. Includes Honors sections. *Coreq:* MICR 4560 and MICR 4571.

**MICR 4571\* Medical and Veterinary Parasitology Laboratory 0** (2) Non-credit laboratory to accompany MICR 4570. *Coreq:* MICR 4570.

**MICR 4910 Undergraduate Research in Microbiology 1-4** (1-4) Individually mentored research problems in various areas of microbiology that introduce undergraduate students to the planning and execution of research experimentation and the presentation of research findings. May be repeated for a maximum of eight credits with consent of instructor. Honors students must take at least six hours under a single research advisor over two semesters. Honors thesis is required. Includes Honors sections. *Preq:* Consent of instructor.

**MICR 4920 Internship in Microbiology 1-4** (1-4) Preplanned internship at an advisor-approved facility to give students learning opportunities beyond their classroom experiences. Students submit a Student Internship Contract and a two-page study plan before the internship and a comprehensive report within one week of the end of the internship. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Consent of instructor.

**MICR 4930 Senior Seminar 2** (2) Capstone course engaging students in analysis and discussion of publications from the technical and non-technical literature in biological sciences and from current topics of biology appearing in other media. Students complete their undergraduate on-line digital portfolios. Emphasis is placed on ethical issues that arise as a result of biological research. *Preq:* Senior standing and COMM 1500 or COMM 2500 or ENGL 3150.

**MICR 4940 Selected Topics in Creative Inquiry II** 2-3 (1-3) Disciplinary and multidisciplinary group research projects with the goal of developing the students' ability to discover, analyze, and evaluate data. Students are required to document their research activities in their portfolios. May be repeated for a maximum of six credits. Honors students must take at least six credits over a two-semester period with the same research advisor and write an honors thesis. These credits may include BIOL 3940, BIOL 4940 or both. Includes Honors sections. May also be offered as BIOL 4940. *Preq:* Consent of instructor. *Coreq:* MICR: 4941.

**MICR 4941 Selected Topics in Creative Inquiry II Laboratory 0** (3-6) Non-credit laboratory to accompany MICR 4940. May also be offered as BIOL 4941. *Coreq:* MICR 4940.

**MICR 4950 Service Learning in Biology 2-4** (1-2) Combines service and academic learning while helping pre-college or college students learn about the fundamental aspects of science. Provides lecture and laboratory experiences as students learn to prepare and participate in supervised laboratory teaching for pre-college or college students. May be repeated for a maximum of six credits. *Preq:* Consent of instructor. *Coreq:* MICR 4951.

**MICR 4951 Service Learning in Biology Laboratory 0** (3-9) Non-credit laboratory to accompany MICR 4950. *Coreq:* MICR 4950.

## MARKETING

*Professors:* M.J. Dorsch, C.R. Duke, S.J. Grove, W.E. Kilbourne, G.M. Pickett, M.A. Raymond, *Chair;* *Associate Professors:* R. Gomes, C.D. Hopkins, P.A. Knowles, J.N. Moore; *Assistant Professors:* D.H. Bennett, R.R. Mullins, J.C. Siemens, S.D. Swain, A.E. Thyroff, P.D. Weathers; *Lecturers:* A.C. Fine, J.G. Gaubert, C.W. McElveen

**MKT 2980 Creative Inquiry—Marketing 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of faculty member/mentor.

**MKT 3010 Principles of Marketing 3** (3) Principles and concepts involved in planning, pricing, promoting, and distributing of goods and services. Includes Honors sections. *Preq:* ECON 2000 or ECON 2110 or ECON 2120 or any 2000-level APEC course; and sophomore standing.

**MKT 3020 Consumer Behavior 3** (3) Examination of selected individual and group behavioral science concepts and their application to the understanding of consumer decision making. *Preq:* MKT 3010.

- MKT 3140 New Venture Creation I** 3 (3) First in a two-part series that continues with MGT (ELE) 3150 assessing entrepreneurial opportunities. Focuses on creativity, idea generation, market opportunity analysis, strategy, and methods of entry. Opportunity analysis may be developed into a full new venture plan in ELE 3150 or MGT 3150. May also be offered as ELE 3140. *Preq:* Junior standing.
- MKT 3210 Sports Marketing** 3 (3) Exploration of the essentials of effective sports marketing. Topics include application of marketing principles in the sports area, licensing issues, sponsorships and endorsements, stadium and arena marketing, broadcasting and media considerations, public policy and sports, and unique marketing challenges for sport specific products (football, basketball, baseball, motorsports, etc.). *Preq:* MKT 3010.
- MKT 3900 Junior Honors Research** 1 (1) Students select and complete a research project approved by a faculty advisor, in conjunction with an approved three-credit marketing course (other than MKT 3010 or 4310). Students are expected to display a command of marketing theory and an ability to apply theory to their research. *Preq:* MKT 3010 and membership in Calhoun Honors College and consent of faculty member supervising research.
- MKT 3980 Creative Inquiry—Marketing** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of faculty member/mentor
- MKT 3990 Marketing Internship** 3 (3) Pre-planned, preapproved, faculty-supervised marketing internships. Credit is only given for internships of at least ten full-time, consecutive weeks with the same internship provider. To be taken Pass/No Pass only. May be taken only once. *Preq:* MKT 3010 and consent of instructor.
- MKT 4200 Professional Selling** 3 (3) Current theories about the selling of goods and services to organizational buyers in the context of long-term relationships. Role playing, video-taped presentations, and other techniques are generally employed to enhance interpersonal communication skills. *Preq:* Junior standing and MKT 3010.
- MKT 4230\* Promotional Strategy** 3 (3) Emphasizes promotion as the communication function of marketing. Attention is given to communication theory and promotion's relation to mass and interpersonal communication. Factors affecting promotional decision-making process are explored, and promotion as a competitive tool is examined. *Preq:* MKT 3010.
- MKT 4240 Sales Management** 3 (3) Comprehensive examination of the planning, implementation, and control of professional sales organizations. *Preq:* MKT 3010 and MKT 4200.
- MKT 4250 Retail Management** 3 (3) Retailing is studied from a decision-making approach. Topics include target market analysis, location analysis, merchandising, human resources, pricing and promotion. *Preq:* MKT 3010.
- MKT 4260 Business-to-Business Marketing** 3 (3) Study and analysis of the unique aspects of marketing goods and services to organizational buyers rather than household consumers. Emphasis is on developing strategic responses to market opportunities given competitive behavior. *Preq:* MKT 3010.
- MKT 4270\* International Marketing** 3 (3) Study of marketing from the international point of view. Emphasis is on the necessary modification of marketing thinking and practice for foreign markets due to individual environmental differences. *Preq:* MKT 3010.
- MKT 4280\* Services Marketing** 3 (3) Exploration and study of the nature of service organizations and the principles that guide the marketing of their products. Emphasis is on a marketing mix that is fundamentally different than that found in traditional goods marketing. *Preq:* MKT 3010.
- MKT 4290\* Public and Nonprofit Marketing** 3 (3) Examines the role and application of marketing in public and nonprofit settings. Focuses on a conceptual understanding of the marketing discipline and marketing processes and shows how basic concepts and principles of marketing are applicable to public and nonprofit organizations. *Preq:* MKT 3010.
- MKT 4300\* Marketing Product Management** 3 (3) Management of the firm's product or service offerings. Topics include new product screening, evaluation, and development; product line and mix analysis, abandonment decisions, brand manager's role, new product development department, and others. Emphasis is on decision making. *Preq:* MKT 3010.
- MKT 4310 Marketing Research** 3 (3) Research used in marketing decision making. Emphasizes methods and techniques used in planning, collection, processing, and utilizing information. Topics include research design, sources of information, questionnaire design, sampling, data collection, and data analysis. *Preq:* Marketing major and MKT 3010 and STAT 3090. *Preq or concurrent enrollment:* MGT 3100.
- MKT 4330 Sport Marketing Strategy** 3 (3) Provides students with basic knowledge about brand management as it applies to sport. Addresses basic principles and guiding precepts of how sport-based organizations build strong brands. *Preq:* MKT 3210.
- MKT 4340 Sport Promotion** 3 (3) Emphasizes the promotional function of sport. Topics include event sponsorship, developing media relationships, endorsements, promotion objective setting and budgeting, media planning and scheduling, and utilizing the tools of promotion within a sport context. Integrated Marketing Communication provides the theoretical and managerial framework for how these factors are utilized optimally. *Preq:* MKT 3210.
- MKT 4430 Advertising Strategy** 3 (3) Advertising strategy emphasizing knowledge of target audiences, along with the messages to communicate effectively with them. Foundations include knowing, motivating, and changing behavior of target audience. Issues include models for decisions, tools for promotion, and integrated advertising plans. *Preq:* MKT 3010.
- MKT 4450 Macromarketing** 3 (3) Examines the relationship between marketing and society, focusing on the social impact of marketing practices. Topics include technology, ethics, materialism, globalization, environmental sustainability, and the political and economic philosophy underlying marketing. Course is multidisciplinary and uses a variety of readings to cover each topic area. *Preq:* MKT 3010 and junior standing.
- MKT 4500 Strategic Marketing Management** 3 (3) Application of marketing constructs in analyzing and solving marketing problems. Emphasizes information systems, data analysis, and critical-thinking skills in solving marketing problems in a wide range of managerial decision areas, including, but not limited to, new product development, pricing, advertising, personal selling, channels, and international marketing. *Preq:* Marketing major and MKT 3010 and six credits of 4000-level marketing courses.
- MKT 4900 Senior Honors Thesis Research** 3 (3) Students, in consultation with a Marketing faculty member, choose a topic for the honors thesis and produce a research proposal that involves an imaginative approach to the subject, a sufficient literature review, a comprehensive introduction to the research topic, and a detailed research plan. *Preq:* MKT 3900.
- MKT 4910 Senior Honors Thesis Writing and Presentation** 3 (3) Students implement their research plans, write up their reports, and present and defend their Senior Honors Theses to an audience of Marketing faculty, Honors students, and invited others. *Preq:* MKT 4900.
- MKT 4950\* Selected Topics** 3 (3) In-depth examination of timely topics in marketing. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Preq:* MKT 3010.
- MKT 4980 Creative Inquiry—Marketing** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of faculty member/mentor.
- MKT 4990 Independent Study** 1-3 (1-3) Directed readings or independent research in selected marketing areas. Topics must be selected and proposed by student. Proposals must be approved by instructor. May be repeated for a maximum of three credits. *Preq:* MKT 3010 and consent of instructor.

## MILITARY LEADERSHIP

*Professor:* J. Mullinax, *Chair;* *Assistant Professors:* P. Andrews, T. Bras, G. Hansel, K. Norris, R. Rozetar

- ML 1010 Leadership Fundamentals I** 2 (2) Study of leadership focused at the individual level. Students learn effective communicating skills, ethical decision making, small group management, and mental and physical conditioning. Skills are applied in a variety of challenging training events during laboratory, including rappelling, water survival, land navigation, and team athletics. *Coreq:* ML 1011.
- ML 1011 Leadership Fundamentals I Laboratory** 0 (1) Non-credit laboratory to accompany ML 1010. *Coreq:* ML 1010.

- ML 1020 Leadership Fundamentals II 2 (2)** Continued study of leadership focused at the individual and team levels. Topics include problem solving, critical thinking, leadership styles, and group cohesion. Leadership laboratory training includes small tactics and weapons firing. *Coreq:* ML 1021.
- ML 1021 Leadership Fundamentals II Laboratory 0 (1)** Non-credit laboratory to accompany ML 1020. *Coreq:* ML 1020.
- ML 2010 Leadership Development I 2 (2)** Study of leadership focused at the team level. Students develop leadership skills through public speaking, managing small groups, and mentoring first-year students. Skills are applied in a variety of challenging training events during leadership laboratory, including rappelling, water survival, land navigation, and team-building exercises. *Coreq:* ML 2011.
- ML 2011 Leadership Development I Laboratory 0 (1)** Non-credit laboratory to accompany ML 2010. *Coreq:* ML 2010.
- ML 2020 Leadership Development II 2 (2)** Continued study of leadership at the team and small group levels. Focuses on moral leadership, officership, and the Army as a profession. Leadership laboratory training includes small unit tactics, airmobile operations, and weapons firing. Students lead teams throughout the semester. *Coreq:* ML 2021.
- ML 2021 Leadership Development II Laboratory 0 (1)** Non-credit laboratory to accompany ML 2020. *Coreq:* ML 2020.
- ML 2100 Leaders Training Course 4 (8)** Five-week leadership camp conducted on an Army post. Students' pay and expenses are provided by the U.S. Army. Environment is rigorous and focused on leadership development. No military obligation is incurred. Completion of this course qualifies students for entry into the Army ROTC Advanced Course.
- ML 3010 Advanced Leadership I 3 (2)** Study of leadership focused on decision making, planning, communicating, and executing. Addresses motivational techniques, the role of a leader, and performance assessment. Provides students with leadership management tools and methodology. Students are responsible for training, developing, and mentoring Basic Course students. Students apply learned techniques in leadership laboratory. *Preq:* ML 2020 or ML 2100. *Coreq:* ML 3011.
- ML 3011 Advanced Leadership I Laboratory 0 (2)** Non-credit laboratory to accompany ML 3010. *Coreq:* ML 3010.
- ML 3020 Advanced Leadership II 3 (2)** Continuation of leadership study focusing on collective skills training, tactics, and small group instruction. Synthesizes various components of training, leadership, and team-building learned during the Basic Course and ML 3010. Final step in students' progression prior to the Leader's Development and Assessment Course. *Preq:* ML 3010. *Coreq:* ML 3021.
- ML 3021 Advanced Leadership II Laboratory 0 (2)** Non-credit laboratory to accompany ML 3020. *Coreq:* ML 3020.
- ML 3900 American Army Military Experience 3 (3)** Covers the purpose of the American military experience from its Colonial origins to today's War on Terrorism. Topics include the evolution of U.S. joint forces and coalition operations, effects of United States society on its military, and how leaders utilize the military decision making process. How historical leaders developed critical thinking skills about the human dimensions of war is also discussed. *Preq:* Enrollment in Army ROTC program.
- ML 4010 Organizational Leadership I 3 (2)** Culmination of leadership study in preparation for commissioning as Army officers. Students continue exercising leadership and management skills as senior cadet leaders. Leadership instruction focuses on coordinating activities with staffs, communicating effectively, counseling and mentoring subordinates, training management and ethics. *Preq:* ML 3020. *Coreq:* ML 4011.
- ML 4011 Organizational Leadership I Laboratory 0 (2)** Non-credit laboratory to accompany ML 4010. *Coreq:* ML 4010.
- ML 4020 Organizational Leadership II 3 (2)** Continuation of ML 4010. Focuses on the continued study of moral, ethical, and legal issues faced by leaders. Includes instruction in administrative and logistical management. Requires students to apply their knowledge individually and collectively to solve problems and improve the organization. *Preq:* ML 4010. *Coreq:* ML 4021.
- ML 4021 Organizational Leadership II Laboratory 0 (2)** Non-credit laboratory to accompany ML 4020. *Coreq:* 4020.
- ML 4510 Organizational Leadership III 3 (2)** Transitional leadership development and training for completion cadets and others designed to enhance practical experiences in managing organizational training programs, develop leadership skills by serving in cadet staff positions, develop small group decision making and conflict management skills, and reinforce physical fitness and lifestyle skills required of leaders. May be repeated for a maximum of six credits. *Preq:* ML 3020. *Coreq:* ML 4511.
- ML 4511 Organizational Leadership III Laboratory 0 (3)** Non-credit laboratory to accompany ML 4510. *Coreq:* ML 4510.

## MATERIALS SCIENCE AND ENGINEERING

- MSE 1010 Materials Technology in Everyday Life 3 (3)** Introduces principles of materials science benefiting citizens. Students learn how to make intelligent choices about everyday materials and devices and present their informed opinions through class discussion and group projects involving controversial topics such as recycling, green manufacturing, and nanotechnology.
- MSE 2010 Yarn Structures and Formation 4 (3)** Study of fiber processing systems required to transform various fibrous materials into yarn. Involves the machine principles and theories, relationship of the fibers to the process and the resultant yarn structures, and subsequent analysis of the yarn structure to define quality and to determine suitable manufacturing practices. *Preq:* MSE 2500. *Coreq:* MSE 2011.

- MSE 2011 Yarn Structures and Formation Laboratory 0 (3)** Non-credit laboratory to accompany MSE 2010. *Coreq:* MSE 2010.
- MSE 2020 Fabric Structures, Design, and Analysis 4 (3)** Study of fabric formation techniques designed to explore the principles and theories of modern technology. Evaluation and analysis of weaving, knitting, and nonwoven fabrication of textile structures. *Preq:* MSE 2010. *Coreq:* MSE 2021.
- MSE 2021 Fabric Structures, Design, and Analysis Laboratory 0 (3)** Non-credit laboratory to accompany MSE 2020. *Coreq:* MSE 2020.
- MSE 2100 Introduction to Materials Science 3 (3)** Introductory course in materials science designed primarily for engineering students. Studies the relation between the electrical, mechanical, and thermal properties of products and the structure and composition of these products. All levels of structure are considered from gross structures easily visible to the eye through electronic structure of atoms. *Preq:* CH 1010 and MATH 1080.
- MSE 2410 Metrics Laboratory 1 (3)** Provides basic knowledge of statistical techniques and testing procedures used to evaluate materials. Includes sampling procedures, calculation of averages, confidence intervals, Weibull statistics, precision and accuracy to enable quality decision making. *Preq or concurrent enrollment:* MSE 2100.
- MSE 2500 Polymer and Fiber Materials I 3 (3)** Introduction to the broad fields of textile, fiber, and polymer science and engineering with emphasis on the scientific, technological, and business principles utilized in producing fibers, yarns, and fabrics; enhancing fabric functionality by dyeing, finishing, and printing; and establishing end-use products.
- MSE 2510 Materials Science and Engineering Portfolio I 1 (1)** Introduces students to the concept of self-paced professional development throughout their plans of study. Each student is assigned a faculty member to act as mentor and advisor. *Preq:* Consent of instructor.
- MSE 3000 Honors Seminar 1 (1)** Acquaints students enrolled in the Departmental Honors Program with current research issues in the profession. This assists students in preparing a research proposal for the Senior Thesis. To be taken Pass/No Pass only. *Preq:* Junior standing and admission to departmental honors program.
- MSE 3030 Textile Chemistry 3 (3)** Study of the properties and reactions of aliphatic and aromatic organic compounds. Emphasizes mechanistic interpretations and the development of synthetic schemes leading to polyfunctional compounds of the types encountered in the textile industry. *Preq:* CH 1020. *Preq or concurrent enrollment:* MATH 2060 or MATH 2070.
- MSE 3190 Materials Processing I 3 (3)** Introduction into the principles underlying the processing/manufacturing of ceramic, polymeric, and metallic materials. *Preq or concurrent enrollment:* MSE 2100.
- MSE 3240 Statistics for Materials Science and Engineering 3 (3)** Introduction to statistics with particular application to the material industry. Covers measures of central value and variation, probability, the normal curve, tests of hypotheses, elementary correlation, and regression. *Preq:* Sophomore standing.

- MSE 3260 Thermodynamics of Materials 3 (3)** Introduction to physical laws that govern the equilibrium products of chemical and thermal reactions. Covers the three laws of thermodynamics, phase equilibria, energy requirements for reactions, material corrosion, and environmental stability. *Preq:* CH 1020 and MSE 2100 and MATH 1080 and PHYS 2210.
- MSE 3270 Transport Phenomena 3 (3)** Kinetic aspects of mass, heat, and fluid transport as they relate to the processing and performance of materials. *Preq or concurrent enrollment:* MSE 2100 and MSE 3260 and MATH 2080.
- MSE 3280 Phase Diagrams for Materials Processing and Applications 3 (3)** Teaches students to use single component, binary, and ternary phase diagrams to analyze material processing routes and utilization. Considers reaction pathways by which material microstructure evolves and the relationship of reaction pathway to equilibrium phase diagrams. Also considers material interactions/degradation during use. *Preq:* MSE 3260.
- MSE 3420 Structure/Property Laboratory 2 (6)** Provides a basic understanding of how microstructure interrelationships and processes affect the physical properties of materials and how environmental effects modify structure and mechanical behavior of materials. *Preq:* MSE 2410.
- MSE 3610 Processing of Metals and Their Composites 3 (3)** Examines the control of microstructure-property relationships in metallic materials and their composites through development and selection of innovative manufacturing methods. *Preq or concurrent enrollment:* MSE 3270.
- MSE 3950 Honors Research I 3 (9)** Individual research under the direction of a Materials Science and Engineering faculty member. *Preq or concurrent enrollment:* MSE 3270 and MSE 3280.
- MSE 4020\* Solid State Materials 3 (3)** Discussion of the properties of solids as related to structure and bonding with emphasis on electronic materials. Band structure theory, electronic, and optical properties are treated. *Preq:* MSE 3260 and MATH 2080 and PHYS 2210.
- MSE 4070 Senior Capstone Design 3 (1)** Work with industrial partners who have materials-related processes or product problems. Emphasizes interdisciplinary team approach and global perspective of products and problems. Incorporates critical thinking, group effectiveness, and problem solving with materials and processes. Collaborative efforts between industry and student academic teams are employed. *Preq:* IE 3840. *Preq or concurrent enrollment:* MSE 4410. *Coreq:* MSE 4071.
- MSE 4071 Senior Capstone Design Laboratory 0 (6)** Non-credit laboratory to accompany MSE 4070. *Coreq:* MSE 4070.
- MSE 4130\* Noncrystalline Materials 3 (3)** Study of the fundamentals of the noncrystalline state. Includes cooling kinetics and effects on formation as well as physical properties of noncrystalline substances in metallic, polymeric, and ceramic systems. *Preq:* MSE 3260. *Preq or concurrent enrollment:* MSE 4020.
- MSE 4150\* Introduction to Polymer Science and Engineering 3 (3)** Chemistry of monomers and polymers and the chemical and physical properties of polymers are discussed emphasizing fiber forming, synthetic polymers. Includes molecular characterization, structure, morphology, and mechanical properties as they relate to the design of polymer systems for end uses in textiles, geotextiles, plastics and fiber-reinforced composite materials. Includes Honors sections. *Preq:* CH 2240; or both CH 2010 or CH 3300.
- MSE 4160\* Electrical Properties of Materials 3 (3)** Covers a range of topics dealing with electrical and magnetic materials, including metal and polymer conductors, insulators, ceramic and polymer materials for dielectric applications, and ferroelectric, piezoelectric, pyroelectric, and electrooptic materials. Metal and ceramic magnetic materials are also discussed.
- MSE 4220\* Mechanical Behavior of Materials 3 (3)** Covers the microstructural basis of deformation and fracture in ceramic, metallic, and polymeric systems. *Preq:* CE 2010 and MATH 2080.
- MSE 4240\* Optical Materials and Their Applications 3 (3)** Introduces the interaction of materials with light. Specific topics include fundamental optical properties, materials synthesis, optical fiber and planar waveguides, and the componentry and systems-level aspects of optical communication systems. *Preq:* MSE 4020 and MSE 4130.
- MSE 4320 Manufacturing Processes and Systems 3 (3)** Plant layout and design for manufacturing of ceramic products. Emphasizes process control and verification of processing results. Includes adaptation of computers in process simulation/robotics and the use of programmable logic controllers and robotics in processing. *Preq:* MSE 3260.
- MSE 4330 Combustion Systems and Environmental Emissions 3 (3)** Study of the application of burners, burner controls, firing atmospheres, hydrocarbon fuels, and other energy resources to industrial kilns, furnaces, and firing operations. Topics include energy resources, fuel chemistry, combustion analysis, ratio control systems, flow and pressure measurement and control, kiln atmosphere controls, industrial burners, and flames. *Preq:* MSE 3260.
- MSE 4410 Manufacturing Laboratory 1 (3)** Provides students with the understanding of process optimization. Emphasizes the use of complex experimental design schemes to elucidate the interrelationships between processing, microstructural development, and resulting properties. *Preq:* MSE 3420.
- MSE 4450 Practice of Materials Engineering 1 (1)** Students working in groups present and discuss practical, ethical, safety, business, and selected technical topics. Invited speakers discuss various aspects of the engineering world. To be taken Pass/No Pass only. *Preq:* MSE 4320.
- MSE 4500 Materials Science and Engineering Portfolio 2 (2)** Students working in groups present and discuss practical, ethical, safety, and business topics in the polymer and textile industries. Students are required to complete their electronic portfolios. To be taken Pass/No Pass only.
- MSE 4510\* Materials Science and Engineering Portfolio II 1 (1)** Student continues self-paced professional development throughout the rest of his/her plan of study by working with the faculty member assigned to act as mentor and advisor. *Preq:* MSE 2510 and consent of instructor.
- MSE 4550 Polymer and Fiber Laboratory 1 (3)** High molecular weight polymers are prepared from monomers, and their chemical and physical properties are measured as functions of critical end use parameters using instrumental and physical methods. *Preq or concurrent enrollment:* MSE 4150.
- MSE 4560\* Polymer and Fiber Materials II 3 (2)** Chemicals used in the preparation of fabric for dyeing and finishing. Oxidizing and reducing agents and their control and effect on various fibers. Colloidal and surface active properties of various compounds and the fundamental factors influencing these properties. *Preq:* MSE 4150. *Coreq:* MSE 4561.
- MSE 4561\* Polymer and Fiber Science II Laboratory 0 (3)** Non-credit laboratory to accompany MSE 4560. *Coreq:* MSE 4560.
- MSE 4570\* Color Science 3 (3)** Understanding of physical, chemical, and mechanical principles behind the application of colors and finishes to textiles. Requires an appreciation of fiber chemistry and morphology, dye and finish structures and reactivity and mechanical principles behind equipment used to effect transfer of these chemicals onto the textile substrate. Includes Honors sections.
- MSE 4580\* Surface Phenomena in Materials Science and Engineering 3 (3)** Introduction to surface phenomena focusing on fiber science. Fundamentals of interfacial phenomena embrace thermodynamics of surfaces, physics of adhesion, wetting, and finishing emphasizing specific features associated with interactions of liquids and chemicals with fibers and fibrous materials. *Preq:* Junior standing in engineering or science.
- MSE 4590 Color Science Laboratory 1 (3)** Introduction to common dyeing and printing methods and to some of the machinery necessary to carry out dyeing operations. *Preq or concurrent enrollment:* MSE 4570.
- MSE 4600 Surface Phenomena in Materials Science and Engineering Laboratory 1 (3)** Covers finishing in addition to dyeing operations and their instrumental control. *Preq or concurrent enrollment:* MSE 4580.
- MSE 4610 Polymer and Fiber Materials III 3 (2)** Familiarizes students with the physical properties of textile and high performance fibers and how these properties influence process and end-use performance; method of measuring those properties; and how those properties are related to structural features of the fiber. Includes Honors sections. *Coreq:* MSE 4611.
- MSE 4611 Polymer and Fiber Materials III Laboratory 0 (2)** Non-credit laboratory to accompany MSE 4610. *Coreq:* MSE 4610.
- MSE 4620\* Properties of Textile Structures 3 (2)** Yarn and fabric properties, their scientific significance and analysis. Dimensional, structural, and mechanical interrelationships are established and evaluated. *Coreq:* MSE 4621.

**MSE 4621\* Properties of Textile Structures Laboratory 0** (2) Non-credit laboratory to accompany MSE 4620. *Coreq:* MSE 4620.

**MSE 4640\* Nonwoven Structures 3** (2) Nonwoven fabric structures, their manufacture, properties, and applications. Methods of nonwoven fabric formation, resultant material characteristics and end-use applications are examined. *Preq:* MSE 2010. *Coreq:* 4641.

**MSE 4641\* Nonwoven Structures Laboratory 0** (2) Non-credit laboratory to accompany MSE 4640. *Coreq:* MSE 4640.

**MSE 4900\* Selected Topics in Materials Science and Engineering 1-3** (1-3) Study of topics not ordinarily covered in other courses. Taught as the need arises. Typical topics could include current research in a specific area or technological advances. May be repeated for a maximum of six credits, but only if different topics are covered. Includes Honors sections. *Preq:* Consent of instructor.

**MSE 4910 Undergraduate Research 1-3** (2-6) Investigation of a typical materials science and engineering research problem under the direct supervision of a faculty member. After completing the research, students prepare a formal written and oral report. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**MSE 4950 Honors Research II 3** (9) Individual research under the direction of a Ceramic and Materials Engineering faculty member. *Preq:* MSE 3950.

**MSE 4970 Honors Thesis 1** (1) Preparation of honors thesis based on research conducted in MSE 3950 and MSE 4950. *Preq:* MSE 4950.

## MUSIC

*Professors:* P.L. Buyer, L.U. Harder, L.L. Li-Bleuel, D.R. Rash; *Associate Professors:* L. Dzuris, N.M. Hosler, A.R. Levin, M. Spede, B.A. Whisler; *Assistant Professor:* J. Durham; *Lecturers:* M.T. Anderson, H.D. Bannister Jr., I. Bracchitta, L.L. Browder, D. Conley, M.S. Craig, J.T. Daugherty, S.M. Fischer, C. Goodloe, T. Hurlburt, E. Jacobi, R. Jacobus, L.F. Kibler, D.R. Kirkpatrick, E. Lapin, L. Odom, L. Parsons, L.K. Pyle, D.E. Stevenson, L.T. Warlick, P. Warneck

**MUSIC 1010 Beginning Class Piano 1** (2) Thorough introduction to basic keyboard skills including solo and ensemble repertoire, technique, applied keyboard theory, and performance. Applied music fee is assessed.

**MUSIC 1020 Intermediate Class Piano 1** (2) Continued work on keyboard skills, applied keyboard theory, solo and ensemble repertoire, and performance. Applied music fee is assessed. *Preq:* MUSIC 1010.

**MUSIC 1110 Beginning Class Guitar 1** (2) Introduction to basic guitar skills, including finger-style technique, strumming, and song accompaniment. Students develop skills and appreciation of the discipline through teacher-led drills, ensemble playing, and the exploration of guitar history, style, and the impact of various players and composers on the medium. Applied music fee is assessed.

**MUSIC 1120 Intermediate Class Guitar 1** (2) Continued work on guitar skills, including finger-style, strumming, pick playing, ensemble playing, and soloing. Also includes music theory for guitarists such as keys, scales, and chord building, as well as discussions of the impact of various players and composers on the medium. Applied music fee is assessed. *Preq:* MUSIC 1110.

**MUSIC 1210 Beginning Class Voice 1** (2) Introduction to basic vocal skills, including breathing, tone production, diction, intonation, and interpretation. Includes solo and ensemble repertoire. In-class group and individual performances are required. Applied music fee is assessed.

**MUSIC 1420 Music Theory I 3** (3) Introduces the materials of music theory, including notation, scales, keys, intervals, basic rhythms, and meter, triads and seventh chords, chord inversions, and non-chord tones. *Coreq:* MUSIC 1430.

**MUSIC 1430 Aural Skills I 1** (2) Beginning aural skills, which include Solfege, singing and identifying intervals and scales, identifying triads and seventh chords, sight singing simple melodies in major and minor keys, and taking dictation of simple melodies in major and minor keys. *Coreq:* MUSIC 1420.

**MUSIC 1440 Music Theory II 3** (3) Continuation of MUSIC 1420 with added emphasis on part writing, small and larger formal structures, and secondary functions and modulation, in both classical and popular genres. *Preq:* MUSIC 1420. *Coreq:* MUSIC 1450.

**MUSIC 1450 Aural Skills II 1** (2) Continuation of MUSIC 1430 with added emphasis on sight singing and taking dictation with more complex intervals and in various modes. *Preq:* MUSIC 1430. *Coreq:* MUSIC 1440.

**MUSIC 1510 Applied Music 1** (1) Individual study in performance medium (piano, voice, strings, woodwinds, brass, percussion, guitar, organ, or carillon). One 30-minute lesson each week, for which a minimum of four hours practice is required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* Consent of instructor, based upon a qualifying audition.

**MUSIC 1520 Applied Music 1** (1) Continuation of MUSIC 1510. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 1510 and consent of instructor.

**MUSIC 1530 Applied Music for Majors 1** (1) Individual study in vocal or instrumental performance (voice, woodwinds, brass, strings, percussion or keyboards). One 45-minute lesson each week. Jury required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* Performing Arts major (Music Concentration) and consent of instructor, based upon qualifying audition.

**MUSIC 1540 Applied Music for Majors 1** (1) Continuation of MUSIC 1530. Jury and performance on a recital are required. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 1530 and consent of instructor.

**MUSIC 1800 Introduction to Music Technology 3** (2) Introduction to music notation, sequencing, digital audio, sound reinforcement, analog and digital recording, and other current music technologies. *Preq:* Production Studies in Performing Arts major. *Coreq:* MUSIC 1801.

**MUSIC 1801 Introduction to Music Technology Laboratory 0** (3) Non-credit laboratory to accompany MUSIC 1800. *Coreq:* MUSIC 1800.

**MUSIC 1950 Creative Inquiry—Music 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**MUSIC 2100 Music Appreciation: Music in the Western World 3** (3) Deepens students' appreciation of their musical heritage through study of the elements of the musical language and its development in Western culture. Includes Honors sections.

**MUSIC 2420 Music Theory III 3** (3) Continuation of MUSIC 1440, focusing on late 19th- and 20th-century and early 21st-century techniques. *Preq:* MUSIC 1440. *Coreq:* MUSIC 2430.

**MUSIC 2430 Aural Skills III 1** (2) Continuation of MUSIC 1450, with the addition of harmonic dictation in inversions, melodic/harmonic dictation, and the identification of formal structures through listening. *Preq:* MUSIC 1450. *Coreq:* MUSIC 2420.

**MUSIC 2510 Applied Music 1** (1) Continuation of MUSIC 1520. Applied music fee is assessed. *Preq:* MUSIC 1520 and consent of instructor.

**MUSIC 2520 Applied Music 1** (1) Continuation of MUSIC 2510. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSIC 2510 and consent of instructor.

**MUSIC 2530 Applied Music for Majors 1** (1) Continuation of MUSIC 1540. May be repeated for credit on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSIC 1540 and consent of instructor.

**MUSIC 2540 Applied Music for Majors 1** (1) Continuation of MUSIC 2530. May be repeated on other performance media with departmental approval. Jury and performance on a recital are required. Applied music fee is assessed. *Preq:* MUSIC 2530 and consent of instructor.

**MUSIC 2950 Creative Inquiry—Music 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**MUSIC 3080 Survey of Broadway Musicals I 3** (3) Introduction to Broadway musical repertoire from the Golden Age of Broadway: 1943–964. Emphasizes the music with attention to production detail, historical perspective, and social milieu. May also be offered as THEA 3080.

- MUSC 3090 Survey of Broadway Musicals II 3 (3)** Survey of Broadway musical repertoire from new conceptual shows from 1965 to the present day. Emphasizes the music with attention to production detail, historical perspective, and social milieu. May also be offered as THEA 3090.
- MUSC 3110 History of American Music 3 (3)** Music in America from 1620 to the present. Indigenous and borrowed influences are examined.
- MUSC 3120 History of Jazz 3 (3)** Comprehensive survey of jazz elements and styles. A historical perspective from Dixieland to bebop to jazz/rock is included.
- MUSC 3130 History of Rock and Roll 3 (3)** Comprehensive survey of rock elements, styles, and artists. Emphasizes the evolution of rock and roll including a broad examination of musical influences. Course content examines how rock and roll both reflected and influenced social issues.
- MUSC 3140 World Music 3 (3)** Introduction to ethnomusicology and music of the world's peoples. Emphasis is placed on music through culture.
- MUSC 3170 History of Country Music 3 (3)** Chronological study of country music origins, styles, and artists. Emphasizes the evolution of country music from a cultural expression of the South to a commercial art form of worldwide appeal.
- MUSC 3180 History of Audio Technology 3 (3)** Surveys the historical development of audio technology and its social impacts and consequences. Technologies include automatic instruments, recording devices, radio, amplification, consumer listening devices, and distribution formats.
- MUSC 3230 Piano Accompanying I 1 (3)** Group study in piano accompanying. Focuses on sight-reading and choral, vocal, and instrumental accompanying. Students take group lessons and accompany choral groups and/or applied music students.
- MUSC 3250 CU Carillonists 1 (2)** Group study in playing the 47-bell University carillon. One two-hour meeting each week for which a minimum of two hours of individual practice is required. Participation in a recital is required. Students are expected to have musical keyboard experience.
- MUSC 3290 Musical Theatre Vocal Performance 3 (2)** Trains singer-actors in musical theatre repertoire. A study of repertoire via master classes, individual instruction, research of the historical context of Broadway music, studio performance, observation, and peer evaluation, culminating in a public showcase performance. May also be offered as THEA 3290. *Coreq:* MUSC 3291.
- MUSC 3291 Musical Theatre Vocal Performance Laboratory 0 (2)** Non-credit laboratory to accompany MUSC 3290. May also be offered as THEA 3291. *Coreq:* MUSC 3290.
- MUSC 3300 Small Ensemble 1 (3)** Ensembles: devoted to the musical training of instrumental, vocal ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Enrollment in simultaneous sections is allowed.
- MUSC 3310 Pep Band 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. Simultaneous enrollment in multiple sections is allowed. Audition required.
- MUSC 3320 Woodwind Quintet 1 (3)** Ensembles: advanced study of woodwind chamber music media. One one-hour class meeting each week, for which a minimum of two hours of ensemble practice is required. Audition required. *Preq or concurrent enrollment:* MUSC 3620.
- MUSC 3330 String Quartet 1 (3)** Ensembles: advanced study of string quartet repertoire. Two 90-minute meetings each week for which a minimum of two hours of practice is required. Audition required. *Preq or concurrent enrollment:* MUSC 3690.
- MUSC 3340 Flute Choir 1 (3)** Ensembles: study of flute ensemble literature. One 60-minute meeting each week for which a minimum of two hours of practice is required. Audition required.
- MUSC 3360 Percussion Ensemble 1 (2)** Ensembles: study and performance of percussion ensemble literature. One two-hour class meeting each week, for which a minimum of two hours of individual practice is required. Audition required. *Preq or concurrent enrollment:* MUSC 3310 or MUSC 3620 or MUSC 3630 or MUSC 3640 or MUSC 3690.
- MUSC 3370 Steel Drum Band 1 (2)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time. Rehearsals also include discussions of steel band history and performance practice. Audition required.
- MUSC 3410 Men's Breakout Ensemble 1 (2)** Small ensembles: study of male a cappella/popular music on an advanced level. Audition required. *Preq or concurrent enrollment:* MUSC 3700 or MUSC 3720.
- MUSC 3420 Women's Breakout Ensemble 1 (2)** Small ensembles: study of women's a cappella/popular vocal music on an advanced level. Audition required. *Preq or concurrent enrollment:* MUSC 3700 or MUSC 3710.
- MUSC 3430 Men's Small Ensemble 1 (2)** Small ensembles: study of male a cappella/popular, barbershop, and nostalgic music on an advanced level. *Preq or concurrent enrollment:* MUSC 3700 or MUSC 3720.
- MUSC 3440 Vocal Jazz Ensemble 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. *Preq or concurrent enrollment:* MUSC 3700 or MUSC 3710 or MUSC 3720.
- MUSC 3510 Applied Music 1 (1)** Continuation of MUSC 2520. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSC 2520 and consent of instructor.
- MUSC 3520 Applied Music 1 (1)** Continuation of MUSC 3510. Students are required to perform an appropriate solo in a student recital. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSC 3510 and consent of instructor.
- MUSC 3530 Applied Music for Majors 1 (1)** Continuation of MUSC 2540. May be repeated on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSC 2540 and consent of instructor.
- MUSC 3540 Applied Music for Majors 1 (1)** Continuation of MUSC 3530. May be repeated on other performance media with departmental approval. Juried half-recital performance is required. Applied music fee is assessed. *Preq:* MUSC 3530 and consent of instructor.
- MUSC 3610 Marching Band 1 (3)** Ensembles: devoted to musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Offered fall semester only.
- MUSC 3620 Symphonic Band 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Audition required.
- MUSC 3630 Jazz Ensemble 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Audition required.
- MUSC 3640 Concert Band 1 (2)** Devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time.
- MUSC 3690 Symphony Orchestra 1 (3)** College-community orchestra devoted to performing works from the standard repertoire. Public performances are given periodically in addition to the minimum rehearsal time. Audition required.
- MUSC 3700 Clemson University Singers 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time. Audition required.
- MUSC 3710 Women's Glee 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time.
- MUSC 3720 Men's Glee 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given in addition to the minimum rehearsal time.
- MUSC 3730 University Chorus 1 (3)** Ensembles: devoted to the musical training of ensemble members through reading and rehearsal of appropriate music. Public performances are given periodically in addition to the minimum rehearsal time.
- MUSC 3950 Creative Inquiry—Music 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.



**MUSC 3980 Special Topics in Music 3 (3)**  
Consideration of select areas of study in music not addressed by other music courses. May be repeated once for credit.

**MUSC 4000\* Music in the Elementary Classroom 3 (3)**  
Familiarizes teachers in the elementary classroom with traditional, Kodaly, Orff, and Kindermusik approaches in correlating music with language arts, mathematics, and social studies.

**MUSC 4050 Instrumental and Vocal Arranging 3 (2)**  
Advanced study of the properties of instruments and voices and their combination in various small and large ensembles. Emphasis is placed on applying this knowledge to the creation of instrumental and vocal arrangements. *Preq:* MUSC 1800 and MUSC 1420. *Coreq:* MUSC 4051.

**MUSC 4051 Instrumental and Vocal Arranging Laboratory 0 (3)**  
Non-credit laboratory to accompany MUSC 4050. *Coreq:* MUSC 4050.

**MUSC 4150 Music History to 1750 3 (3)**  
Development of Western music from antiquity to 1750, emphasizing representative literature from various styles and periods. Music ensemble and/or lesson experience is recommended.

**MUSC 4160 Music History Since 1750 3 (3)**  
Development of Western music from 1750 to the present, emphasizing representative literature from various styles and periods. Music ensemble and/or lesson experience is recommended.

**MUSC 4300 Conducting 3 (3)**  
Study of choral and instrumental conducting. Emphasis is on manual conducting techniques, attitudes, philosophies, and responsibilities necessary for the preparation, planning, and execution of artistic conducting. *Preq:* MUSC 1420.

**MUSC 4510 Applied Music 1 (1)**  
Continuation of MUSC 3520, guiding students in interpretation of advanced solo and ensemble literature. Students are required to perform an appropriate solo in a student recital. May be repeated for credit with departmental approval of differing performance media. Applied music fee is assessed. *Preq:* MUSC 3520 and consent of instructor.

**MUSC 4520 Applied Music 1 (1)**  
Continuation of MUSC 4510. Students are required to perform an appropriate solo in a student recital. Applied music fee is assessed. *Preq:* MUSC 4510 and consent of instructor.

**MUSC 4530 Applied Music for Majors 1 (1)**  
Continuation of MUSC 3540. May be repeated on other performance media with departmental approval. Jury is required. Applied music fee is assessed. *Preq:* MUSC 3540 and consent of instructor.

**MUSC 4540 Applied Music for Majors 1 (1)**  
Continuation of MUSC 4530. May be repeated on other performance media with departmental approval. Juried full recital performance is required. Applied music fee is assessed. *Preq:* MUSC 4530 and consent of instructor.

**MUSC 4950 Creative Inquiry—Music 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**MUSC 4990\* Independent Studies 1-3 (1-3)**  
Tutorial work for students with special interests in music study outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

## NONPROFIT LEADERSHIP

**NPL 3000 Foundations in Nonprofit Leadership 3 (3)**  
Course provides foundational knowledge and understanding of non-profit organizations, their development, governance, maintenance and operations within modern society. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula.

**NPL 3010 Understanding Stakeholders for Non-Profit Organizations 3 (3)**  
Comprehensive review of identifying and reaching stakeholders in non-profit organizations. Material covers basic promotion of non-profit services, including use of media through advertising, public service announcements, events and partnerships, as well as approaches to copy writing, public speaking and working with local and regional governments. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula. *Preq:* NPL 3000.

**NPL 3020 Funding and Accountability in Non-Profit Organizations 3 (3)**  
This course prepares students to understand and participate in the fiscal management of non-profit organizations. Course focuses on understanding, producing, interpreting, and communicating financial information to staff, board members, volunteers and other stakeholders. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula. *Preq:* NPL 3000.

**NPL 3030 Personnel Leadership in Non-Profit Organizations 3 (3)**  
Introduces students to the principles of personnel leadership as related to paid, un-paid and seasonal employees of non-profit organizations. Recruitment, selection/hiring, retention and motivation, and evaluation as it pertains to the non-profit sector and its unique blend of paid and un-paid workers is discussed. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula. *Preq:* NPL 3000.

**NPL 3040 Risk Management of Non-Profit Organizations 3 (3)**  
Conceptual and practical aspects of risk management and legal issues associated with non-profit organizations are covered. Foundational knowledge of the non-profit organization as a legal entity, including risk identification, management, transfer and financing, liability, and ethics. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula. *Preq:* NPL 3000.

**NPL 3900 Practicum I 1 (3)**  
Under agency supervision, students spend 60 hours observing and implementing activities, events, and programs in a nonprofit, faith-based, grassroots, or organization approved by instructor. To be taken Pass/No Pass only. *Preq:* NPL 3000.

**NPL 4900 Non-Profit Leadership Preceptorship 3 (9)**  
Provides students with the opportunity to gain practical experience in an environment where learning about non-profit operations and management is the chief objective. Under the guidance of a qualified professional supervisor, students apply theories, concepts, philosophies and techniques acquired in the classroom. To maximize the student's professional development, the practicum is to encompass as many operation and management aspects of the cooperating agency as possible. To be taken Pass/No Pass only. NPL courses may not substitute for courses in Accounting, Economics, Executive Leadership & Entrepreneurship, Finance, Management, or Marketing curricula. *Preq:* NPL 3000.

## NURSING

*Professors:* J.N. Eggert, B.J. Holaday, V.G. Parker, R.H. Pruitt, *Director;* D.F. Willoughby; *Associate Professors:* S.C. Davis, A.E. Johnson, N.K. Meehan, S.M. Timmons, M.A. Wetsel; *Assistant Professors:* R. Amerson, J.M. DeLuca, L.M. Duggan, T.K. Fasolino, C.M. Hernandez, J.J. Whitcomb; *Instructors:* H.S. Temples, S.S. Webster; *Lecturers:* P.A. Botchway, T. Busby, N.R. Ewing, J.S. Gillespie, J.G. Lanham, K.L. Massa, C.S. Murton, A.K. Pye, K.J. Smith, J. Vess, L. Wagner

**NURS 1020 Nursing Success Skills 2 (2)**  
Introduction to a variety of topics critical to a student's success as a Nursing major and future professional. Topics include time management, goal setting, test taking, campus and nursing department resources and policies, critical thinking, and diversity. Students have the opportunity to discover and practice many procedures, techniques, and tips, as well as apply principles learned to their future career in nursing. *Preq:* Nursing major.

**NURS 1400 Computer Applications in Nursing 3 (3)**  
Introduces students to nursing and the application of computer technology in the delivery of health care. Covers existing computer health-care applications, emerging trends and forecast future needs. Social and ethical issues related to technology are discussed. *Preq:* Acceptance into the Nursing program.

**NURS 1980 Creative Inquiry—Nursing 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/faculty.

**NURS 2980 Creative Inquiry—Nursing 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**NURS 3000 Seminar in Health Care Topics 1-4 (1-4)**  
Individualized in-depth study in a selected health care area; may have a clinical component and/or special projects. Open to non-Nursing majors. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

- NURS 3030 Medical-Surgical II: Nursing of Adults** 7 (3) Incorporates theoretical and empirical knowledge from physical and social sciences. Uses critical thinking to provide holistic, safe, individualized nursing care to adults, including health promotion, maintenance, restoration, and health teaching. *Preq:* NURS 3040 and NURS 3100 and NURS 3120 and NURS 3400. *Coreq:* NURS 3031 and NURS 3050.
- NURS 3031 Medical-Surgical II: Nursing of Adults Laboratory** 0 (12) Non-credit laboratory to accompany NURS 3030. *Coreq:* NURS 3030.
- NURS 3040 Pathophysiology for Health Care Professionals** 3 (3) Focuses on disease mechanisms and recognition of the manifestations of these mechanisms in body systems. Discussion also includes pharmacologic and mechanical interventions commonly associated with specific disease processes and application to patient-care situations. *Preq:* BIOL 2230 and junior standing in Nursing.
- NURS 3050 Psychosocial Nursing** 3 (3) Lifespan approach to examine psychosocial, developmental, family, and cultural factors that influence individuals from diverse populations and their families in the promotion, maintenance, and restoration of health. The use of the nursing process, critical thinking, therapeutic communication, and psychosocial nursing interventions is explored. *Coreq:* NURS 3030.
- NURS 3070 Family Nursing in the Community** 4 (3) Bridge course for registered nurse students that focuses on nursing care of families across the lifespan in the context of the community. Major emphasis is on practice activities to assist individuals in achieving or maintaining wellness in the family, home, and community environments. *Coreq:* NURS 3071 and NURS 4250.
- NURS 3071 Family Nursing in the Community Laboratory** 0 (2) Non-credit laboratory to accompany NURS 3070. *Coreq:* NURS 3070.
- NURS 3100 Health Assessment** 3 (2) Introduces concepts of health, wellness, and illness. Focuses on physical, psychosocial, and cultural assessment for the well adult client with variations across the lifespan. Includes interviewing techniques. *Coreq:* NURS 3101 and NURS 3120 and NURS 3400.
- NURS 3101 Health Assessment Laboratory** 0 (3) Non-credit laboratory to accompany NURS 3100. *Coreq:* NURS 3100.
- NURS 3110 Health Promotion Across the Lifespan** 2 (2) Focuses on health promotion and illness prevention activities across the lifespan for individuals and families in the community. Major emphasis is on nursing's role in the acquisition and maintenance of health as well as the identification and modification of health risk factors. *Preq:* NURS 3100 and NURS 3120 and NURS 3200.
- NURS 3120 Medical-Surgical I: Foundations of Nursing** 4 (2) Focuses on therapeutic nursing interventions, including selected psychomotor skills, communication skills, and teaching/learning. *Coreq:* NURS 3100 and NURS 3121 and NURS 3400.
- NURS 3121 Medical-Surgical I: Foundations of Nursing Laboratory** 0 (6) Non-credit laboratory to accompany NURS 3120. *Coreq:* NURS 3120.
- NURS 3180 Multidisciplinary Approach to End-of-Life Care** 3 (3) Integrates principles of care to increase comfort at the end of life, presented within a framework that encompasses the physical, psychosocial, and spiritual dimensions of an individual. Coursework also includes ethical and legal issues related to advance directives, reimbursement, and regulatory topics. *Preq:* PSYC 2010 or SOC 2010.
- NURS 3190 Health Assessment for RNs** 3 (3) Expands knowledge of health assessment techniques utilized with well or ill adult clients. Emphasizes data collection as a basis for critical thinking in professional nursing practice. *Preq:* Admission to RN/BS program.
- NURS 3200 Professionalism in Nursing** 3 (3) Application of critical thinking skills is the core of professional nursing roles in multidisciplinary approaches to health care. Analysis of the historical development of modern nursing. Examination of issues of providing nursing care to diverse populations within the context of professional standards. Includes medical nomenclature. *Preq:* BIOL 2220.
- NURS 3230 Gerontology Nursing** 2 (2) Introduction of theories of aging. Focuses on complex health care issues of aging and chronic care, including promotion, maintenance, and restoration of health of the elderly. Scientific concepts address physiological, psychological, and sociological issues of aging and chronic illness. *Preq:* NURS 3100 and NURS 3120.
- NURS 3280 Honors Seminar I** 2 (2) Serves as the foundation for senior honors projects. Students identify a topic of interest, a faculty mentor, and team members for their honors project and begin to review the literature in their areas of interest. *Preq:* Admission to Nursing Department Honors program.
- NURS 3300 Research in Nursing** 3 (3) Introduction to conceptual frameworks, models, and theories related to nursing. Analysis of reported research in nursing and related disciplines. Ethical, moral, and legal issues are discussed in relation to nursing research. Includes Honors sections. *Preq:* NURS 3100 and NURS 3120 and NURS 3200; or admission to the RN/BS or accelerated Nursing program.
- NURS 3330 Health Care Genetics** 3 (3) Focuses on the new genetics and the implications for health care professionals. Discussion includes applications of the evolving genetics technology and services to changing life stages. Issues of ethics relevant to various genetic disorders is also addressed. May also be offered as HCG 3330. *Preq:* BIOL 2220.
- NURS 3340 Integrative Healing: Complementary/Alternative Healthcare** 3 (3) Introduction to healing practices that are complementary with/and alternative (C/A) for conventional Western medicine. Includes exploration of research, principles, techniques, and methods of C/A used in health and healing.
- NURS 3400 Pharmacotherapeutic Nursing Interventions** 3 (3) Focuses on the integration of nursing process with pharmacotherapeutics, administration, monitoring, and related client education. Includes major drug classifications, indications for use, side effects, interactions, routes of administration, usual dosages and contraindications. *Preq:* Junior standing in Nursing. *Coreq:* NURS 3100 and NURS 3120.
- NURS 3980 Creative Inquiry—Nursing** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- NURS 4010 Mental Health Nursing** 5 (3) Application of theories and the nursing process to identify, implement, and evaluate nursing interventions for the care of clients with psychiatric disorders. *Preq:* NURS 3030 and NURS 3050 and NURS 3110 and NURS 3230 and NURS 3300. *Coreq:* NURS 4011 and NURS 4110 and NURS 4120.
- NURS 4011 Mental Health Nursing Laboratory** 0 (6) Non-credit laboratory to accompany NURS 4010. *Coreq:* NURS 4010.
- NURS 4030 Medical-Surgical III: Complex Nursing of Adults** 5 (3) Focuses on the biological, psychological, philosophical, and sociocultural influences on complex health problems related to acute and traumatic conditions. Emphasizes the concepts of circulation, oxygenation, homeostasis, and compensation in acutely ill adults. *Preq:* NURS 4010 and NURS 4110 and NURS 4120. *Coreq:* NURS 4031.
- NURS 4031 Medical-Surgical III: Complex Nursing of Adults Laboratory** 0 (6) Non-credit laboratory to accompany NURS 4030. *Coreq:* NURS 4030.
- NURS 4050 Leadership and Management in Nursing** 3 (2) Focuses on the role of the professional nurse in managing nursing care. Theories and research related to leadership, power, management, organizations, regulation, and ethics are discussed. Directed laboratory experiences are provided. *Preq:* Admission to RN/BS program. *Coreq:* NURS 4051.
- NURS 4051 Leadership and Management in Nursing Laboratory** 0 (2) Non-credit laboratory to accompany NURS 4050. *Coreq:* NURS 4050.
- NURS 4060 Issues in Professionalism** 3 (3) Analysis of the development of professional nursing. Consideration of educational issues, legal and economic issues, health policy, leadership, cultural variations, and the influence of values in ethical decisions and nursing practice. *Preq:* Admission to RN/BS program.
- NURS 4100 Leadership Management and Nursing Care Practicum** 6 (3) Focuses on the role of the professional nurse in practicing and managing nursing care. Theories and research related to clinical practice, leadership, power, management, organizations, regulation, ethics, and licensure preparation are discussed. Directed lab experiences are provided under preceptor supervision. *Coreq:* NURS 4030 and NURS 4100.
- NURS 4101 Leadership Management and Nursing Care Practicum Laboratory** 0 (9) Non-credit laboratory to accompany NURS 4100. *Coreq:* NURS 4100.

- NURS 4110 Nursing Care of Children 5 (3)** Focuses on child health problems and health maintenance. Emphasizes biological, pathophysiological, psychological, and sociocultural concepts related to nursing care of children with acute, critical, and chronic illnesses. Includes strategies for alleviation of illnesses, restoration of wellness, promotion and maintenance of health, growth, and development. *Prq:* NURS 3030 and NURS 3050 and NURS 3110 and NURS 3230 and NURS 3300. *Coreq:* NURS 4010 and NURS 4111.
- NURS 4111 Nursing Care of Children Laboratory 0 (6)** Non-credit laboratory to accompany NURS 4110. *Coreq:* NURS 4110.
- NURS 4120 Nursing Care of Women and Their Families 5 (3)** Emphasizes biological, psychological, and sociocultural concepts; identification of appropriate nursing strategies to enhance individual capacity to achieve or maintain wellness in the family, home, community, and hospital environment. *Prq:* NURS 3030 and NURS 3050 and NURS 3110 and NURS 3230 and NURS 3300. *Coreq:* NURS 4010 and NURS 4121.
- NURS 4121 Nursing Care of Women and Their Families Laboratory 0 (6)** Non-credit laboratory to accompany NURS 4120. *Coreq:* NURS 4120.
- NURS 4140 Community Health Nursing and Health Promotion 5 (3)** Focuses on community health nursing of families and community groups, including community assessment, screening, health promotion and health education, with emphasis on the health of clients and population groups in homes, schools, industries and other community agencies and organizations. *Prq:* NURS 4010 and NURS 4110 and NURS 4120 and admission to the accelerated Nursing program. *Coreq:* NURS 4141.
- NURS 4141 Community Health Nursing and Health Promotion Laboratory 0 (6)** Non-credit laboratory to accompany NURS 4140. *Coreq:* NURS 4140.
- NURS 4150 Community Health Nursing 4 (2)** Consideration of health promotion activities for family and community groups with emphasis on community assessment, screening, and health teaching/counseling. Practice activities are related to health promotion in population groups and nursing care of homebound clients. Laboratory settings include homes, schools, industries, and other community organizations. *Prq:* NURS 4010 and NURS 4110 and NURS 4120. *Coreq:* NURS 4151.
- NURS 4151 Community Health Nursing Laboratory 0 (6)** Non-credit laboratory to accompany NURS 4150. *Coreq:* NURS 4150.
- NURS 4160 Concepts in Transcultural Nursing 3 (3)** Focuses on transcultural nursing concepts, theory and practices in order to provide culturally congruent nursing care. Culture care beliefs, values and practices of specific cultures are analyzed based on Leininger's Culture Care Theory, using the ethn nursing method and research findings.
- NURS 4200 Senior Honors I 2 (2)** Students develop a proposal for a major thesis, directed study project, or research project under the guidance of a faculty preceptor. *Prq:* Honors section of NURS 3300.
- NURS 4250 Community Nursing 4 (3)** Consideration of health promotion activities for groups within the community with emphasis on community assessment, screening, and health teaching/counseling. Practice activities are related to health promotion in population groups and nursing care of homebound clients. Laboratory settings include homes, schools, industries, public health department, and other community agencies. *Prq:* Admission to RN/BS program. *Coreq:* NURS 3070 and NURS 4251.
- NURS 4251 Community Nursing Laboratory 0 (2)** Non-credit laboratory to accompany NURS 4250. *Coreq:* NURS 4250.
- NURS 4280 Senior Honors II 2 (2)** Students implement a proposal for a major directed study project or research thesis under the guidance of a faculty preceptor. *Prq:* NURS 4200.
- NURS 4980 Creative Inquiry—Nursing 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Prq:* Consent of faculty member/mentor.
- NURS 4990 Independent Study 1-4 (1-4)** In-depth study in an area of special interest in Nursing. Students develop specific objectives with a faculty member with expertise in the area of interest. May be repeated for a maximum of six credits. *Prq:* Consent of instructor.

## NUTRITION

See also courses listed under Animal and Veterinary Sciences, Biochemistry, and Food Science.

*Professors:* A.B. Bodine II, K.L. Cason, T.C. Jenkins, D.V. Maurice; *Associate Professors:* M.D. Condrasky, A.M. Fraser, V.J. Haley-Zitlin; *Assistant Professor:* E.D. Jesch; *Senior Lecturer:* R.M. Haliema; *Adjunct Assistant Professor:* S.S. Baker, M.A. Parisi

**NUTR 2030 Introduction to Principles of Human Nutrition 3 (3)** Study of nutrient functions and requirements, food choices, dietary adequacy, and role of nutrition in physical fitness. Deals with social and scientific issues; evaluation and interpretation of nutrition sources from government, private, academic, and the health care sectors.

**NUTR 2040 Nutrition Across the Life Cycle 3 (3)** Using current evidence, course examines nutrition issues and requirements across the life cycle, including pre-conception, pregnancy, lactation, infancy, childhood, adolescence, adulthood, and aging. Methods of nutritional assessment for each stage of life are explored. *Prq:* NUTR 2030.

**NUTR 2050 Nutrition for Nursing Professionals 3 (3)** Investigation of targeted general and clinical nutrition topics, including principles of nutrition, life-cycle nutrition, relationship of diet to health and disease, and the role of nursing professionals and nutrition. Credit toward a degree will be given for only one of NUTR 2030, 2050 or 4510. *Prq:* Nursing major. *Prq* or concurrent enrollment: BIOL 2220.

**NUTR 2100 Nutrition and Physical Activity 3 (3)** Topics include role of carbohydrates, fats, and proteins on energy utilization during exercise; altering body composition and improving fitness with diet and physical activity; importance of fluid intake on performance; effectiveness of dietary supplements and ergogenic aids; and choosing a diet appropriate for individual physical activity levels. *Prq:* BIOL 1200; and one of BIOL 1220 or BIOL 1230.

**NUTR 2160 Evidence-Based Nutrition 1 (1)** Introduction to research methods, ethics in research, and evidence-based nutrition guidelines within the profession of nutrition and dietetics. *Prq:* Food Science major.

**NUTR 4010\* Fundamentals of Nutrition 3 (3)** Biochemical and physiological fundamentals of nutrition applicable to man and domestic animals. Considers digestive processes and absorption and metabolism of carbohydrates, lipids, proteins, water, minerals, and vitamins. Discusses energy metabolism and comparative anatomy and physiology of digestive systems. Offered fall semester only. Includes Honors sections. *Prq:* BCHM 3050 or CH 2230.

**NUTR 4180 Professional Development in Dietetics 1 (1)** Provides the steps for dietetic internship application process; career development in the dietetics field; and concepts of professional standards. *Prq:* Food Science major and Junior standing.

**NUTR 4190 Professional Development in Nutrition 1 (1)** Career development strategies to assist students pursuing professional or graduate degrees. The focus is on standards used for admission, application preparation, and what to do when admitted. *Prq:* Food Science major and Junior standing.

**NUTR 4200 Selected Topics in Nutrition 1-3 (1-3)** Comprehensive study of special topics in nutrition not covered in detail or contained in other courses. Current developments in each area are stressed. May be repeated for a maximum of three credits, but only if different topics are covered. *Prq:* Food Science major and Senior standing.

**NUTR 4210 Special Problems in Nutrition 1-4 (1-4)** Independent research investigation in nutrition. Special emphasis is on developing a research proposal, conducting the research, and reporting the findings. May be repeated for a maximum of six credits, but only if different topics are covered. *Prq:* Food Science major and Senior standing.

**NUTR 4240\* Medical Nutrition Therapy I 4 (3)** Principles of nutritional assessment, education, and counseling skills; development of medical nutrition therapy for individuals with obesity and eating disorders, gastrointestinal disorders, metabolic and renal disorders. *Prq:* Food Science major or minor; and BIOL 2220 and BIOL 2230 and NUTR 4510. *Coreq:* NUTR 4241.

**NUTR 4241\* Medical Nutrition Therapy I Laboratory 0 (3)** Non-credit laboratory to accompany NUTR 4240. *Coreq:* NUTR 4240.

**NUTR 4250\* Medical Nutrition Therapy II 4 (3)**  
Development of medical nutrition therapy for individuals with various disease states, including cardiovascular, hepatic, musculoskeletal, and neoplastic disorders. Also considers sociocultural and ethnic aspects of food consumption and alternative nutrition therapies. Includes Honors sections. *Preq:* Food Science major or minor; and BIOL 2220 and BIOL 2230 and NUTR 4240. *Coreq:* NUTR 4251.

**NUTR 4251\* Medical Nutrition Therapy II Laboratory 0 (3)** Non-credit laboratory to accompany NUTR 4250. *Coreq:* NUTR 4250.

**NUTR 4260\* Community Nutrition 3 (3)** Study of fundamentals of nutrition care delivery in community programs beginning with assessment and problem identification and continuing through the development, implementation, and evaluation of nutrition intervention programs. *Preq:* Food Science major or minor and NUTR 4510.

**NUTR 4270 Nutrition Counseling I 1 (1)** Examination and application of nutrition counseling methods, theories and strategies needed to promote nutrition behavior change. Assessment and interpretation of client information, development of client goals, and evaluation of interventions are discussed. *Preq:* NUTR 4240.

**NUTR 4510\* Human Nutrition 3 (3)** Advanced concepts of nutrition, including physiological handling of nutrients, nutrient-nutrient interactions, and principles of nutritional deficiency and over-nutrition. Factors affecting methods of determining nutritional status, development of nutrition standards, and recent advances in human nutrition. Credit toward a degree will be given for only one of NUTR 2030, 2050 or 4510. *Preq:* Food Science major or minor. *Preq or concurrent enrollment:* BCHM 3050.

**NUTR 4550\* Nutrition and Metabolism 3 (3)** Concepts of metabolism fundamental to understanding normal and therapeutic nutrition are examined. Bioenergetics as well as metabolism of carbohydrates, lipids, amino acids, vitamins, and minerals as they relate to nutrition are discussed. *Preq:* Food Science major or minor; and BCHM 3050 and BIOL 2220. *Preq or concurrent enrollment:* BIOL 2230.

## PERFORMING ARTS

*Professors:* P.L. Buyer, L.U. Harder, D.J. Hartmann, *Chair;* *Associate Professors:* L. Dzuris, N.M. Hosler, A.M. Penna, S. Robert, B.A. Whisler; *Lecturer:* K.W. Moore

**PA 1010 Introduction to Performing Arts 3 (3)** Overview of performing arts, including performance, careers, technology, production, management, community outreach, safety, sales, and marketing. *Preq:* Production Studies in Performing Arts major. *Coreq:* PA 1030.

**PA 1030 Portfolio I 1 (3)** Students develop discipline-specific portfolios that display creative design and contain samples of work that demonstrate integrated learning. *Coreq:* PA 1010.

**PA 1950 Creative Inquiry—Performing Arts 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**PA 2010 Career Planning and Professional Development 3 (2)** Study of selected performing arts topics. Includes seminars and masterclasses with faculty and visiting artists and concert and theatre attendance and evaluation. Emphasis is placed on written communication skills. *Preq:* PA 1010 and Sophomore standing. *Coreq:* PA 2011.

**PA 2011 Career Planning and Professional Development Laboratory 0 (3)** Non-credit laboratory to accompany PA 2010. *Coreq:* PA 2010.

**PA 2790 Performing Arts Practicum I 1 (3)** Practical work on performing arts presentations including backstage technical work, multimedia support, and arts management.

**PA 2800 Performing Arts Practicum II 1 (3)**  
Continuation of practical work on performing arts presentations, with more specialized opportunities for backstage technical work, multimedia support, and arts management training. *Preq:* PA 2790.

**PA 2950 Creative Inquiry—Performing Arts 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**PA 3010 Principles of Arts Administration 3 (2)**  
Continuation of PA 2010 with added focus on critical and ethical analysis of performing arts. Emphasis is placed on oral communication skills. *Preq:* PA 2010 and Junior standing. *Coreq:* PA 3011.

**PA 3011 Principles of Arts Administration Laboratory 0 (3)** Non-credit laboratory to accompany PA 3010. *Coreq:* PA 3010.

**PA 3950 Creative Inquiry—Performing Arts 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**PA 3980 Special Topics in Performing Arts 1-3 (1-3)** Select areas of study in performing arts not addressed by other performing arts course offerings. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* PA 1010 and consent of instructor.

**PA 3990 Internship 1-3 (1-3)** Provides performing Arts majors an opportunity to apply technical, managerial, and artistic concepts in a performing arts environment through preplanned, preapproved, faculty-supervised internships. Minimum of 45 hours of work per credit hour. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* PA 2790 and consent of instructor.

**PA 4010 Capstone Project 4 (3)** Capstone course for Performing Arts majors. Students research, prepare, execute and assess a substantial project for the community as approved by a faculty committee. Students, with faculty guidance, manage all aspects of the project. *Preq:* PA 3010. *Coreq:* PA 4011 and PA 4030.

**PA 4011 Capstone Project Laboratory 0 (3)** Non-credit laboratory to accompany PA 4010. *Coreq:* PA 4010.

**PA 4030 Portfolio II 1 (3)** Students revise discipline-specific portfolios through use of current technologies. Further demonstration of integrated learning is provided with the incorporation of capstone project research content from PA 4010. *Coreq:* PA 4010.

**PA 4910 Performing Arts Honors Research 3 (3)**  
Research for the preparation of an honors project. *Preq:* PA 3010 and consent of department chair.

**PA 4920 Performing Arts Honors Project 3 (3)**  
Preparation and presentation of an honors project. *Preq:* PA 4910 and consent of department chair.

**PA 4950 Creative Inquiry—Performing Arts 1-4 (1-4)**  
In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**PA 4990 Independent Studies 1-3 (1-3)** Supervised study for students with special interests in performing arts outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.

## PAN AFRICAN STUDIES

*Associate Professor:* A. A. Bartley

**PAS 1010 Africa and the Atlantic World 3 (3)**  
Study of Africa and its impact on the culture and life of peoples in the New World. Traces the impact Africans have had on shaping the music, language, dress, art, religion, and culture of the Western world.

**PAS 3010 Introduction to Pan African Studies 3 (3)** Study of African American experience from an Afrocentric perspective from colonial America to the present.

**PAS 4000 Studies in Pan African Studies 3 (3)**  
Study of selected topics or themes in Pan African Studies. Allows for individualized study of specific topics related to Pan African Studies such as music, dance, religion, colonization, slavery, or economic development. May be repeated for a maximum of six credits, but only if different topics are covered.

**PAS 4100 Studies in Africana Experience 3 (3)** Looks at the impact of Africans or African Americans on U.S. society. Interdisciplinary course that allows for the study of Africans and their descendants from a variety of perspectives. Focuses primarily on the United States. May be repeated for a maximum of six credits, but only if different topics are covered.

**PAS 4300 Hip-Hop and African American Contemporary Culture** 3 (3) Examines the controversial history and legacy of Hip-Hop culture, and explores how the artistic expression of the American underclass has evolved into worldwide cultural expression. Combines scholarship and theory with considerable audio and video exposure to various Hip-Hop songs and artists. *Preq:* Sophomore standing.

**PAS 4680 Comparative Racism and Discrimination in the Atlantic World** 3 (3) Seminar in the comparative history of racism and segregation in South Africa and the Americas. *Preq:* Sophomore standing.

**PAS 4710 Directed Studies on the Black Experience in Education** 1-3 (1-3) Students conduct research and produce scholarship on academic, social, and historical issues that impact the Black experience in educational settings. Students may also participate in service learning activities to broaden their understanding and apply their knowledge in the community. May be repeated for a maximum of nine credits.

**PAS 4980\* Seminar on Pan African Studies** 3 (3) Research/writing seminar on the African American experience. Selected topics and themes from 1900 to present. *Preq:* PAS 3010; and one of HIST 3110 or HIST 3120 or HIST 3390.

## PEARCE CENTER FOR PROFESSIONAL COMMUNICATION

**PCPC 4990 Pearce Center Internship** 1-3 (1-3) Students work in the Class of 1941 Studio for Student Communication on projects involving multimodal communications, public relations, graphic design, and publishing. Students edit copy, pitch stories, research and write articles for print, web, and/or video publication, create ePubs, develop and execute social media strategies, design marketing material, develop public relations strategies, design websites, and other related tasks. *Preq:* Consent of instructor.

## PLANT AND ENVIRONMENTAL SCIENCES

*Professors:* H. Liu, T. Whitwell, G. Zehnder, P. Zungoli; *Associate Professors:* P. Agudelo, J. Andrae, E. Mikhailova; *Assistant Professors:* K. Gasic, D. Park, N. Tharayil

**PES 1040 Introduction to Plant Sciences** 3 (3) Fundamental course in plant sciences, including agronomic and horticultural crops of the major agricultural areas of the world and emphasizing the crops of South Carolina. Includes Honors sections.

**PES 2020 Soils** 4 (3) Introduces world land resources, soil formation, classification, and mineralogy. Emphasizes basic chemical and physical properties of soil. Also discusses soil microorganisms, plant nutrients, and fertilization. Soil properties are related to growth. *Preq:* CH 1010 or CH 1020 or GEOL 1010. *Coreq:* PES 2021.

**PES 2021 Soils Laboratory** 0 (2) Non-credit laboratory to accompany PES 2020. *Coreq:* PES 2020.

**PES 3150 Environment and Agriculture** 3 (3) Survey of the interrelationships of the environment and current agriculture and agricultural practices to include both the environmental impacts of agriculture and the role of agriculture in conservation and improving the environment. Includes Honors sections. May also be offered as ENSP 3150. *Preq:* Sophomore standing and one of the following combinations: BIOL 1040 and BIOL 1060; or BIOL 1100 and BIOL 1110; or CH 1010 and CH 1020; or CH 1050 and CH 1060.

**PES 3350 Agricultural Biotechnology** 3 (2) Strategies for the best use of biotechnology and genetic resources to alleviate constraints in global hunger, environmental sustainability, and health. Includes genetic enhancement and chromosome engineering of plant, animal, and microbial systems; issues related to commercial implementation; the impact on developing countries, environmental impact, and governmental policies. *Preq:* GEN 3000. *Coreq:* PES 3351.

**PES 3351 Agricultural Biotechnology Laboratory** 0 (2) Non-credit laboratory to accompany PES 3350. *Coreq:* PES 3350.

**PES 3400 Medical Botany** 3 (3) Study of use of compounds of plant and fungal origin as poisons, hallucinogens, and pharmaceuticals. *Preq:* BIOL 1040 and BIOL 1060 and CH 1020. May also be offered as BIOL 3400.

**PES 3500 Practicum** 1-6 (1-6) Preplanned practical or research experience related to student-selected Soils and Sustainable Crop Systems concentration. Practicum is undertaken with an approved advisor or agency. May be repeated for a maximum of six credits. *Preq:* Soils and Sustainable Crop Systems field of study.

**PES 4010 Academic and Professional Development** 1 (1) Soils and Sustainable Crop Systems majors evaluate, critique, and update portfolios for presentation to future employers. Students work with Career Center and instructor to develop interviewing skills and résumés, access professional goals, and identify skills necessary for reaching goals to be competitive. The importance of ethics in soils and sustainable crop systems careers is discussed.

**PES 4030\* Soil Genesis and Classification** 2 (1) Study of soil morphology and characterization, pedogenic processes, soil-forming factors, and classification of soils. Offered fall semester only. *Preq:* PES 2020. *Coreq:* PES 4031.

**PES 4031\* Soil Genesis and Classification Laboratory** 0 (3) Non-credit laboratory to accompany PES 4030. *Coreq:* PES 4030.

**PES 4050\* Plant Breeding** 3 (3) Application of genetic principles to the development of improved crop plants. Principal topics include the genetic and cytogenetic basis of plant breeding, mode of reproduction, techniques in selfing and crossing, methods of breeding, inheritance in the major crops, and biometrical methods. Offered spring semester only. *Preq:* GEN 3000. *Coreq:* PES 4051.

**PES 4051\* Plant Breeding Laboratory** 0 (2) Non-credit laboratory to accompany PES 4050. *Coreq:* PES 4050.

**PES 4060 Special Problems** 1-3 (1-3) Acquaints students with the scientific method. Literature investigation, planning, and execution of an experiment are integral parts of the course. Not open to students who have taken or are taking PES 4910 and PES 4920. May be repeated for a maximum of six credits. *Preq:* Senior standing.

**PES 4080\* Land Treatment of Wastewater and Sludges** 3 (3) Principles for designing environmentally acceptable land application systems using municipal and industrial wastewater and sludges are presented. Topics include land-limiting constituent analysis; soil-plant interactions; system equipment and design; system operation and management; public acceptance, social, and regulatory issues. Case studies and field trips are planned. May also be offered as BE 4080. *Preq:* Senior standing.

**PES 4090\* Biology of Invasive Plants** 3 (3) Introductory course covering mechanisms of plant invasions. Emphasizes unique traits that confer invasiveness and/or weediness to plants, and how these plant traits interact with the environment to facilitate invasion of agricultural lands, forests, rangelands and less-managed landscapes. Covers various cultural, chemical and biological control aspects. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 3040.

**PES 4210\* Principles of Field Crop Production** 3 (3) Principles for production of field crops. Topics include botany and physiology, tillage, harvesting, storage, and crop quality. Principles are illustrated using examples from various crops. *Preq:* PES 2020; and one of PES 1010 or PES 1040.

**PES 4220\* Major World Crops** 3 (3) Examines the distribution, adaptation, production, and utilization of major agronomic crops of the world. Emphasizes crops important to U.S. agriculture. Specific crops discussed in more detail include corn, wheat, rice, sorghum, soybeans, cotton, tobacco, and peanuts. *Preq:* PES 2020; and PES 1010 or PES 1040.

**PES 4230\* Field Crops—Forages** 3 (3) Establishment, management, and utilization of forage crops in a forage-livestock agroecosystem context. Discusses hay, silage, and pasture utilization. Uses computer models to study complexity of forage-livestock production systems. Includes Honors sections. *Preq:* PES 1040 or PES 2020.

**PES 4260\* Cropping Systems Analysis** 3 (2) Application of agronomic and economic principles in solving problems related to the production and marketing of agronomic crops. Major part of the course is a case study in which detailed analysis of a farm, agribusiness, or environmental situation is made with students making formal written and oral presentations of results. May also be offered as APEC 4260. *Preq:* PES 1040; and Junior standing; and APEC 2020 or ECON 2000 or ECON 2110. *Coreq:* PES 4261.

**PES 4261\* Cropping Systems Analysis Laboratory** 0 (2) Non-credit laboratory to accompany PES 4260. May also be offered as APEC 4261. *Coreq:* PES 4260.

- PES 4330\* Landscape and Turf Weed Management 3 (2)** Weed management strategies that include cultural, biological, and chemical methods are studied for landscape and turfgrass areas. Problem-solving skills and herbicide characteristics are emphasized. May also be offered as HORT 4330. *Coreq:* PES 4331.
- PES 4331\* Landscape and Turf Weed Management Laboratory 0 (2)** Non-credit laboratory to accompany PES 4330. May also be offered as HORT 4331. *Coreq:* PES 4330.
- PES 4450\* Regulatory Issues and Policies 2 (2)** Introduction to regulations of plant agriculture. Emphasizes risk assessment, patenting biotechnology inventions, and ethical issues. Includes survey of state and governmental agencies with responsibilities to avoid risk to humans, non-target organisms, and preservation of food safety, agricultural resources, and natural ecosystems.
- PES 4460\* Soil Management 3 (3)** Basic soil properties are related to compaction, water and solute movement, and root growth. Considers practical management problems and develops solutions based on basic soil characteristics. Problems include erosion, no-tillage, compaction, irrigation, leaching, waste application, golf green management, and orchard establishment. *Preq:* PES 2020.
- PES 4510\* Agricultural Biotechnology and Global Society 1 (1)** In-depth discussion of recent articles on agricultural biotechnology and related global issues. Includes independent and comprehensive literature survey and critical discussions on implementation of biotechnology products in the context of world agricultural production systems and economics. Discusses the role of international agencies and social and ethical issues.
- PES 4520\* Soil Fertility and Management 3 (3)** Study of soil properties, climatic factors, and management systems in relation to soil fertility maintenance for crop production. Considers plant nutrition and growth in relation to crop fertilization and management. *Preq:* PES 2020.
- PES 4530\* Soil Fertility Laboratory 1 (3)** Evaluation and interpretation of soil fertility production. Includes Honors sections. *Preq:* PES 2020.
- PES 4550 Seminar 1 (1)** Presentation of interdisciplinary topics and original research in agronomy, entomology, plant pathology, soils, and related sciences.
- PES 4850\* Environmental Soil Chemistry 3 (3)** Study of soil chemical processes (sorption, desorption, ion exchange, precipitation, dissolution, and redox reactions) of nutrients and inorganic and organic contaminants in soils and organic matter. Chemical complex equilibria and adsorption phenomena at the solid (soil, sediment, and mineral) water interface are emphasized. May also be offered as ETOX 4850 or GEOL 4850. *Preq:* CH 1020 or PES 2020.
- PES 4900\* Beneficial Soil Organisms in Plant Growth 3 (3)** Aspects of biological nitrogen fixation, mycorrhizal fungi, microbial-pesticide interactions, bioremediation, nutrient cycles, and biological pest control related to plant growth, soil/environmental quality; and sustainable agriculture are covered. Students who desire laboratory experience in these topics may register for PES 4060 after consultation with instructor. *Preq:* MICR 3050 or PES 2020 or PLPA 3100.
- PES 4910 Senior Honors Research 3 (1)** Senior division honors research in an agricultural sciences curriculum. In consultation with and under the direction of a professor, students select a research topic, conduct experiments, record data, and make oral presentations of results to the College Honors Program Committee. Open to approved Honors Program students only. *Coreq:* PES 4911.
- PES 4911 Senior Honors Research Laboratory 0 (6)** Non-credit laboratory to accompany PES 4910. *Coreq:* PES 4910.
- PES 4920 Senior Honors Research 3 (1)** Continuation of PES 4910. Senior division honors research in an agricultural sciences curriculum. Upon termination of the research project, students submit formal written reports and make final oral presentations of results to the College Honors Program Committee. Professor-student discussions of additional topics are arranged. *Coreq:* PES 4921.
- PES 4921 Senior Honors Research Laboratory 0 (6)** Non-credit laboratory to accompany PES 4920. *Coreq:* PES 4920.
- PES 4960 Selected Topics in Creative Inquiry 1-2 (1-2)** Disciplinary and multidisciplinary projects with the goal of developing the student's ability to discover, analyze, evaluate, and present data. Students are required to document their activities in their ePortfolios. May be repeated for a maximum of six credits. May also be offered as ENT 4960. *Preq:* Consent of instructor.
- PES 4970 Selected Topics in Creative Inquiry Laboratory 1-2 (1-2)** Disciplinary and multidisciplinary research project with the goal of developing the student's ability to conduct research along with analysis, evaluation and presentation of results. Students are required to document their research activities in their ePortfolios. May be repeated for a maximum of six credits. May also be offered as ENT 4970. *Preq:* Consent of instructor.
- PHILOSOPHY**  
*Professors:* W.A. Maker, *Chair*; T.G. May, D.E. Wueste; *Associate Professors:* C.M. Grau, D. Perpich, S.A. Sarris, K.C. Smith, C.B. Starkey; *Assistant Professor:* C.C. Delmas; *Lecturers:* M. Hannen, A.W. Garnar, J. Ingle, C. Mun, D.L. Stegall
- PHIL 1010 Introduction to Philosophic Problems 3 (3)** Discussion of representative philosophical questions that arise from human thought and action. Characteristic topics are values, knowledge, human nature, and society. Includes Honors sections.
- PHIL 1020 Introduction to Logic 3 (3)** Introduction to methods of evaluating arguments. Gives simple valid argument forms, which can be joined together to produce the logical form of virtually any argument. Informal fallacies may also be considered. Includes Honors sections.
- PHIL 1030 Introduction to Ethics 3 (3)** Philosophical consideration of the nature of ethics, basic ethical issues, and problems and modes of ethical reasoning. Includes Honors sections.
- PHIL 1050 Introductory Seminar in the Big Questions 3 (3)** Introductory seminar dealing with a single important philosophical question such as Who are we? What is the meaning of life? Are we free or determined? Question is pursued throughout the semester with active student involvement. Questions may vary from semester to semester.
- PHIL 1240 Technology and Its Discontents 3 (3)** Philosophical introduction to issues arising from the development of technologies, their implementation, and their integration into society. Considers theoretical questions regarding the nature of technology and its evaluation, as well as issues related to specific technologies.
- PHIL 2100 Evolution and Creation 3 (3)** A critical comparison of evolution and creationism. Students examine the scientific, philosophical, and theological issues this clash brings to light, develop their ability to think through the various claims and counter claims critically, and then articulate a coherent position for themselves. Credit toward a degree will be given for only one of PHIL 2100 or BIOL 2100.
- PHIL 3030 Philosophy of Religion 3 (3)** Critical consideration of the meaning and justification of religious beliefs. Representative topics are the nature and existence of God, religious knowledge, religious language, the problem of evil.
- PHIL 3040 Moral Philosophy 3 (3)** Study of moral problems, their origin in conflicts between duty and desire, and alternative solutions proposed by classical and contemporary writers.
- PHIL 3050 Existentialism 3 (3)** Inquiry into the core themes of existentialism: freedom, meaningfulness or meaningfulness of life, the existence of God, etc. Representative thinkers from the existentialist tradition, such as Dostoyevsky, Kierkegaard, Sartre, and de Beauvoir, are studied.
- PHIL 3120 Philosophy in Ancient China 3 (3)** Study of the history of Chinese philosophy from fifth century BCE, including Confucianism, Daoism, Moism, legalism, Buddhism, Neo-Daoism, and Neo-Confucianism. Examination of Chinese philosophers' views and arguments on questions of life and death, history and society, education and personal cultivation. May not be used to satisfy general foreign language requirements. May also be offered as CHIN 3120.
- PHIL 3130 Philosophy in Modern China 3 (3)** Study of the history of Chinese philosophy from the 19th century BCE, including Confucianism, Daoism, Moism, legalism, Buddhism, Neo-Daoism, and Neo-Confucianism. Examination of Chinese philosophers' views and arguments on questions of life and death, history and society, education and personal cultivation. May not be used to satisfy general foreign language requirements. May also be offered as CHIN 3130.
- PHIL 3140 Comparative Topics in Eastern and Western Philosophy 3 (3)** Study of issues and areas of overlapping concern to Eastern and Western philosophical traditions (e.g., ontology, ethics) with emphasis on both contrasts and convergences in philosophical approaches. Topics may vary.
- PHIL 3150 Ancient Philosophy 3 (3)** Origins and development of rationality as found in the thought of selected philosophers such as Socrates, Plato, and Aristotle.

- PHIL 3160 Modern Philosophy 3 (3)** Development of the modern view as seen in major Western philosophers of the 16th, 17th, and 18th centuries. Thought of Berkeley, Descartes, Hume, Leibniz, Locke, and Spinoza may be considered to illustrate the development of rationalism and empiricism.
- PHIL 3170 Nineteenth-Century Philosophy 3 (3)** Development of 19th-century philosophy emphasizing selected works of philosophers such as Kant, Hegel, Marx, Nietzsche, and Kierkegaard.
- PHIL 3180 Twentieth-Century Philosophy 3 (3)** Historical overview of selected significant movements in 20th-century Western philosophy such as Continental and/or analytic philosophy.
- PHIL 3200 Social and Political Philosophy 3 (3)** Critical consideration of the views of some major philosophers on the nature of the individual's relation to society and the state in the context of their wider philosophical (logical, epistemological, metaphysical, and ethical) doctrines. Philosophers may include Plato, Aristotle, Augustine, Hobbes, Rousseau, Mill, Marx, Hegel, Rawls, and Nozick.
- PHIL 3210 Crime and Punishment 3 (3)** Investigates what sorts of conduct should be criminalized and what society should do with those who engage in criminal activity. Specific topics may include the enforcement of morals, euthanasia, hate crimes, deterrence, retribution, and restitution.
- PHIL 3230 Theory of Knowledge 3 (3)** Examination of concepts, criteria, and decision procedures underlying rational belief and the justification of knowledge claims. Representative answers to the problem of skepticism are considered, with special attention to some leading theories of knowledge.
- PHIL 3240 Philosophy of Technology 3 (3)** Examines technology and representative philosophical assessments of it with a focus on understanding its impact on the human condition.
- PHIL 3250 Philosophy of Science 3 (3)** Philosophical study of problems generated by science, but that are not themselves scientific, such as what comprises a scientific theory; how scientists formulate theories and acquire knowledge; what, if anything, differentiates science from other ways of knowing; what role concepts play in scientific knowledge; whether scientific progress is rational.
- PHIL 3260 Science and Values 3 (3)** Examination of several features of the relation between science and values. Topics may include ethical and social obligations of scientists, role of value judgements in scientific practice, and influence of social and political values on science and scientists.
- PHIL 3270 Philosophy of Social Science 3 (3)** Inquiry into the philosophical foundations of social science, in particular questions of objectivity, explanatory structure, causality, agency, normativism and naturalism, and social determination of knowledge.
- PHIL 3280 Philosophy and Technology of the Body 3 (3)** Examines the interrelation of human bodies and emerging technologies in light of philosophical notions of human nature, personal identity, and the ethical dignity of the human. Emphasizes the influence of social values on scientific and technological developments and the reciprocal impact of these developments on understandings of the body.
- PHIL 3300 Contemporary Issues in Philosophy 3 (3)** Examination of a variety of issues of broad concern to philosophers today. Issues may vary. May be repeated once for credit with departmental consent.
- PHIL 3330 Metaphysics 3 (3)** Examination of issues and problems concerning the ultimate nature of reality. Topics may include the appearance/reality distinction, the nature of existence, freedom and determinism, personal identity, idealism, and realism.
- PHIL 3400 Technology, Environment, and Sustainability 3 (3)** Philosophical examination of how technology contributes to significant environmental change. Considers role of science in justifying claims about (for example) global climate change, role of technology in responding to these changes, how technology affects relations between humans and the extra-human world, and ethical implications of various kinds of technology.
- PHIL 3430 Philosophy of Law 3 (3)** Explanation of the nature of legal theory and the law through a critical examination of the basic concepts and principles of these fields.
- PHIL 3440 Business Ethics 3 (3)** Study of ethical issues created by business activities, relating them to fundamental questions of ethics generally. Representative topics may include hiring, firing, promotions, business and minorities, organizational influence in private lives, consumer interests, economic justice, and reindustrialization.
- PHIL 3450 Environmental Ethics 3 (3)** Study of ethical problems in our dealings with the rest of nature and of how they relate to ethics in general. Representative topics include the basis of ethics, nature and intrinsic value, duties to future generations, economics and the environment, rare species, animal rights, ethics and agriculture, energy doctrine.
- PHIL 3460 Medical Ethics 3 (3)** Examines ethical dilemmas facing modern medicine. Topics may include controversies surrounding death, reproductive technologies, abortion, allocation of resources, the concept of disease, the doctor-patient relationship, and medical research.
- PHIL 3470 Ethics in Architecture 3 (3)** Interdisciplinary course focused on the architectural profession and the practices of design, building, and other processes in a social and business context. Consideration is given to both general moral principles and particular case studies.
- PHIL 3480 Philosophies of Art 3 (3)** Examines some of the predominant attempts to understand art in ancient and modern philosophy and also considers a variety of contemporary views and controversies about the nature, meaning, value, and future of art.
- PHIL 3490 Theories of Gender and Sexuality 3 (3)** Examines the philosophical dimensions of contemporary debates about the relation of sex, gender, and sexuality. May also be offered as WS 3490.
- PHIL 3500 Technology and Philosophy in Nursing 3 (3)** Analyzes influence of increasing application of scientific technology to health care delivery and concomitant ethical issues.
- PHIL 3510 Philosophy of Emotion 3 (3)** Considers a range of classic and contemporary readings on the nature and function of emotion. Topics include cognitive, physiological, and constructionist approaches to understanding emotion, emotion and reason, emotion and morality, and select individual emotions.
- PHIL 3550 Philosophy of Mind and Cognitive Science 3 (3)** Critical examination of philosophical and scientific theories of mental phenomena and of the relationship between mental and material phenomena. Theories of Mind-Body Dualism, Monism, Functionalism, Eliminative and Reductive Materialism, Connectionism, and the status of folk psychology versus cognitive neuroscience are studied.
- PHIL 3600 Symbolic Logic 3 (3)** Introduction to the basic concepts of modern symbolic logic, including the symbolization of statements and arguments and the techniques of formal proof.
- PHIL 3700 Philosophy of War 3 (3)** Examines war from both ethical and strategic perspectives: the nature of a just war, the aims of war, and the kinds of general strategies appropriate for achieving those aims.
- PHIL 3750 Minds and Machines 3 (3)** Examines controversial questions in artificial intelligence and the Computational Theory of Mind. Topics may include: "Can machines think?" "What's involved in being able to think?" "Can machines reason, understand, be conscious, be self-aware, learn, be creative, have emotions, and use natural language?" Focus is on manmade computers and the mind as computer.
- PHIL 3990 Philosophy Portfolio 2 (2)** Creation of a digital portfolio to demonstrate competence in reasoning, critical thinking, and problem solving skills as well as ethical judgment. Course also serves as a resource for academic and professional development. *Prq:* Junior standing in Philosophy.
- PHIL 4010\* Studies in the History of Philosophy 3 (3)** In-depth study of a selected philosopher, philosophical school, or movement. Topics vary. With departmental consent, may be repeated once for credit. Current topics and course descriptions are available in the department's course offering brochure.
- PHIL 4020\* Topics in Philosophy 3 (3)** Thorough examination of a particular philosophical topic, issue, or problem. Topics vary. May be repeated once for credit with departmental consent. Current topics and course descriptions are available in the department's course offering brochure.
- PHIL 4220 Anarchism 3 (3)** Philosophical study of the roots of anarchist thought and its current articulations.
- PHIL 4750 Philosophy of Film 3 (3)** Pursues several issues at the center of recent debate in the philosophy of film. Questions investigated include whether film has an essence that distinguishes it from other art forms, whether films ought to be thought of as having authors or narrators, and whether films can themselves philosophize.

**PHIL 4900 Law, Liberty and Justice Prelaw Internship** 1-3 (1-3) Faculty-supervised internship designed for students in the Law, Liberty and Justice emphasis area of the Philosophy major. Interns are placed with law offices or with institutions and agencies in fields related to law and social policy. May be repeated for a maximum of six credits. To be taken Pass/No Pass only. *Preq:* Philosophy major and Junior standing and consent of internship coordinator.

**PHIL 4920 Creative Inquiry—Philosophy** 1-4 (1-4) Small group work on particular issues with emphasis on involving students in research. Content varies. May be repeated for a maximum of nine credits. *Preq:* Consent of instructor.

**PHIL 4970 Philosophy Honors Research** 3 (3) Students conduct research, clearly define the topic, and complete an annotated bibliography under the supervision of the thesis advisor. *Preq:* Consent of department chair and thesis advisor.

**PHIL 4980 Philosophy Honors Thesis** 3 (3) In consultation with the thesis advisor and committee, students write, revise, defend, and complete the thesis. *Preq:* PHIL 4970 and consent of department chair and thesis advisor.

**PHIL 4990\* Independent Study** 1-3 (1-3) Course of study designed by the student in consultation with a faculty member who agrees to provide guidance, discussion, and evaluation of the project. Student must confer with the faculty member prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

## PHYSICAL SCIENCE

*Lecturer:* M. Nammouz

**PHSC 1070 Introduction to Earth Science** 4 (3) Survey of topics in geology, meteorology, astronomy, and oceanography, emphasizing comprehension and practical application of earth science concepts to experiments. Credit toward a degree will be given for only one of PHSC 1070 or 1170. *Coreq:* PHSC 1071.

**PHSC 1071 Introduction to Earth Science Laboratory** 0 (3) Non-credit laboratory to accompany PHSC 1070. *Coreq:* PHSC 1070.

**PHSC 1080 Introduction to Physical Science** 4 (3) Survey of topics in chemistry and physics emphasizing comprehension and practical application of physical science concepts to experiments. Credit toward a degree will be given for only one of PHSC 1080 or 1180. *Coreq:* PHSC 1081.

**PHSC 1081 Introduction to Physical Science Laboratory** 0 (3) Non-credit laboratory to accompany PHSC 1080. *Coreq:* PHSC 1080.

**PHSC 1170 Introduction to Chemistry and Earth Science for Elementary Education Majors** 4 (3) Integrates topics in chemistry, earth science and environmental science. It emphasizes the interconnections among the various science disciplines and the practical application to experiments and activities appropriate for the elementary classroom. Credit toward a degree will be given for only one of PHSC 1070 or 1170. *Preq:* Elementary Education major. *Coreq:* PHSC 1171.

**PHSC 1171 Introduction to Chemistry and Earth Science for Elementary Education Majors Laboratory** 0 (3) Non-credit laboratory to accompany PHSC 1170. *Coreq:* PHSC 1170.

**PHSC 1180 Introduction to Physics, Astronomy, and Earth Science for Elementary Education Majors** 4 (3) Integrates topics in physics, astronomy, and earth science. It emphasizes the interconnections among the various science disciplines and the practical application to experiments and activities appropriate for the elementary classroom. Credit toward a degree will be given for only one of PHSC 1080 or 1180. *Preq:* PHSC 1170. *Coreq:* PHSC 1181.

**PHSC 1181 Introduction to Physics, Astronomy, and Earth Science for Elementary Education Majors Laboratory** 0 (3) Non-credit laboratory to accompany PHSC 1180. *Coreq:* PHSC 1180.

## PHYSICS

*Professors:* E. Alexov, M.S. Daw, D.H. Hartmann, J.R. King, M.F. Larsen, M.D. Leising, *Chair:* C.D. Marinescu, J.W. Meriwether, B.S. Meyer, A.M. Rao, T.M. Tritt, A. Valentini; *Associate Professors:* S. Brittain, P.J. Flower, G.A. Lehmacher, J. Oberheide, C. Sosolik, E. Takacs, S. Tewari; *Assistant Professors:* M. Ajello, F. Ding, J. He, H. Kang, J. Marlet, H. Sanabria

**PHYS 1010 Current Topics in Modern Physics** 1 (0) Demonstrations and lectures serving as an introduction to different areas of physics and astronomy are presented by various members of the staff. May include such topics as astrophysics, energy, relativity, and weather, as well as visits to the planetarium.

**PHYS 1220 Physics with Calculus I** 3 (3) First of three courses in a calculus-based physics sequence. Topics include vectors, laws of motion, conservation principles, rotational motion, oscillations, and gravitation. Credit for a degree will be given for only one of PHYS 1220, 2000, or 2070. Includes Honors sections. *Preq or concurrent enrollment:* MATH 1060 or MATH 1070.

**PHYS 1240 Physics Laboratory I** 1 (3) Introduction to physical experimentation with emphasis on mechanical systems, including oscillatory motion and resonance. Computers are used in the experimental measurements and in the statistical treatment of data. Credit for a degree will be given for only one of PHYS 1240 or 2090. *Preq or concurrent enrollment:* PHYS 1220.

**PHYS 1990 Creative Inquiry—Physics and Astronomy** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

**PHYS 2000 Introductory Physics** 4 (3) Introduction to classical physics. Includes elements of mechanics, heat, electricity, and light. May not be substituted for PHYS 1220, but may be substituted for PHYS 2070, only with the approval of the Department of Physics and Astronomy. Credit for a degree will be given for only one of PHYS 1220, 2000, or 2070. *Preq or concurrent enrollment:* MATH 1050. *Coreq:* PHYS 2001.

**PHYS 2001 Introductory Physics Laboratory** 0 (2) Non-credit laboratory to accompany PHYS 2000. *Coreq:* PHYS 2000.

**PHYS 2070 General Physics I** 3 (3) Introductory course for students who are not majoring in physical science or engineering. Covers such topics as mechanics, waves, fluids, and thermal physics. Credit for a degree will be given for only one of PHYS 1220, 2000, or 2070. *Preq or concurrent enrollment:* MATH 1020 or MATH 1040 or MATH 1050.

**PHYS 2080 General Physics II** 3 (3) Continuation of PHYS 2070. Covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics. Credit for a degree will be given for only one of PHYS 2080 or 2210. *Preq:* PHYS 2070.

**PHYS 2090 General Physics I Laboratory** 1 (2) Introductory laboratory course for students who are not majoring in physical science or engineering. Covers such topics as mechanics, waves, fluids, and heat. Credit for a degree will be given for only one of PHYS 1240 or 2090. *Preq or concurrent enrollment:* PHYS 2070.

**PHYS 2100 General Physics II Laboratory** 1 (2) Covers such topics as electricity, magnetism, electromagnetic waves, optics, and modern physics. Credit for a degree will be given for only one of PHYS 2230 or 2100. *Preq:* PHYS 2070, 2090. *Preq or concurrent enrollment:* PHYS 2080.

**PHYS 2210 Physics with Calculus II** 3 (3) Continuation of PHYS 1220. Topics include thermodynamics, kinetic theory of gases, electric and magnetic fields, electric currents and circuits, and motions of charged particles in fields. Credit for a degree will be given for only one of PHYS 2080 or 2210. Includes Honors sections. *Preq or concurrent enrollment:* MATH 1080 or MATH 1110.

**PHYS 2220 Physics with Calculus III** 3 (3) Continuation of PHYS 2210. Topics include wave motion, electromagnetic waves, interference and diffraction, relativity, atomic particles, and atomic and nuclear structure. Includes Honors sections. *Preq:* PHYS 2210.

**PHYS 2230 Physics Laboratory II** 1 (3) Experiments in heat and thermodynamics, electrostatics, circuits, and magnetism. Computers are used in statistical treatment of data. Credit for a degree will be given for only one of PHYS 2230 or 2100. *Preq or concurrent enrollment:* MATH 1080 or MATH 1110.

**PHYS 2240 Physics Laboratory III** 1 (3) Experiments involve atomic, molecular, and nuclear systems. Wave particle dualism of light and matter is emphasized. Calculators and computers are used in statistical treatment of data. *Preq or concurrent enrollment:* PHYS 2220.

**PHYS 2400 Physics of the Weather** 3 (3) Descriptive introduction to meteorology. Includes atmospheric thermodynamics, solar radiation, heat budget, atmospheric circulation, force laws governing air motion, fronts, precipitation, synoptic prediction. Special topics of current interest, such as the effect of environmental pollution on weather and the effect of weather on health, are included.



- PHYS 2450 Physics of Global Climate Change** 3 (3) Descriptive study of the heating and cooling balance of the Earth's atmosphere and surface and feedback mechanisms that regulate our climate. Past and future temperature trends, atmospheric greenhouse gas inventories, and solar radiative forcing. Evaluation of claims and news about climate change, and their interaction with public opinion.
- PHYS 2800 Physics and Reality** 3 (3) Non-technical study of the content and meaning of modern physics. Begins with first-principles of physics. Evaluates concepts of substance, matter, locomotion, atomization, fields, space, time, and randomness. Includes quantum mechanics, Bells Theorem, theory of relativity, and Godels Theorem. Intended for a broad audience, including specialists and non-specialists.
- PHYS 2900 Physics Research** 1-3 (1-3) Individual research project in any area of experimental or theoretical physics or astronomy supervised by a physics or astronomy faculty member. Project need not be original but must add to students' ability to carry out research. May be repeated for a maximum of six credits. Students must have a 3.0 minimum grade-point average to enroll in this course. *Preq:* Consent of instructor.
- PHYS 2990 Creative Inquiry—Physics and Astronomy** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- PHYS 3000 Introduction to Research** 1 (2) Acquaints students with current research in physics. Seminars are provided where research activities in various areas of physics and astronomy are summarized. Provides a basis for students to choose a suitable topic for a senior thesis. Includes Honors sections. *Preq:* PHYS 2210.
- PHYS 3110 Introduction to the Methods of Theoretical Physics** 3 (3) Survey of methods and techniques of problem-solving in physics. Emphasizes the application of mathematical techniques to the solution of problems of vectors, fields, and waves in mechanics, electromagnetism, and quantum physics. *Preq:* PHYS 2220.
- PHYS 3120 Methods of Theoretical Physics II** 3 (3) Continuation of PHYS 3110 focused on introducing various mathematical notions widely used in upper level physics courses, such as differential equations, special functions and complex numbers, and complex functions. *Preq:* PHYS 3110.
- PHYS 3150 Introduction to Computational Physics** 3 (3) Basic numerical methods important for data interpretation and modeling in physics, such as interpolation, derivatives, integration, solving differential and matrix equations, and Monte Carlo simulation. Methods are applied to physics problems, including realistic projectile motion, harmonic oscillators, chaotic pendulum, nonlinear systems, and Ising model. *Preq:* PHYS 2220.
- PHYS 3210 Mechanics I** 3 (3) Statics, motions of particles and rigid bodies, vibratory motion, gravitation, properties of matter, flow of fluids. Includes Honors sections. *Preq:* PHYS 2210.
- PHYS 3220 Mechanics II** 3 (3) Dynamics of particles and rigid bodies, Lagrangian and Hamiltonian formulations, vibrations of strings, wave propagation. Includes Honors sections. *Preq:* PHYS 3210.
- PHYS 3250 Experimental Physics I** 3 (1) Introduction to experimental modern physics, measurement of fundamental constants, repetition of crucial experiments of modern physics (Stern-Gerlach, Zeeman effect, photoelectric effect, etc.). Includes Honors sections. *Preq or concurrent enrollment:* PHYS 2220. *Coreq:* PHYS 3251.
- PHYS 3251 Experimental Physics I Laboratory** 0 (4) Non-credit laboratory to accompany PHYS 3250. *Coreq:* PHYS 3250.
- PHYS 3260 Experimental Physics II** 3 (1) Continuation of PHYS 3250. Includes Honors sections. *Coreq:* PHYS 3261.
- PHYS 3261 Experimental Physics II Laboratory** 0 (4) Non-credit laboratory to accompany PHYS 3260. *Coreq:* PHYS 3260.
- PHYS 3550 Modern Physics** 3 (3) Study of the topics of modern physics, including relativity, atomic physics, quantum mechanics, condensed-matter physics, nuclear physics, and elementary particles. Includes Honors sections. *Preq:* PHYS 2220 and MATH 2060.
- PHYS 3560 Modern Physics Overview** 1 (1) Overview of topics in modern physics, including a short description of the structure of solids, nuclear physics, and particle physics. *Preq:* PHYS 2220.
- PHYS 3990 Creative Inquiry—Physics and Astronomy** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.
- PHYS 4010 Senior Thesis** 1-3 (1-3) Semi-original theoretical, experimental, or computational research project performed under the direction of a faculty member. Fields available include astronomy, astrophysics, atmospheric physics, biophysics, high energy physics, relativity, solid state physics, and statistical mechanics. May be repeated for a maximum of six credits. Includes Honors sections. *Preq:* Nine credits of physics at the 3000- or 4000-level.
- PHYS 4170\* Introduction to Biophysics I** 3 (3) Introduction to the application of physics to biological problems. Topics include review of elementary chemical and biological principles, physics of biological molecules, and fundamentals of radiation biophysics. Includes Honors sections. *Preq:* MATH 2060 and PHYS 2210.
- PHYS 4200\* Atmospheric Physics** 3 (3) Study of physical processes governing atmospheric phenomena. Topics include thermodynamics of dry and moist air, solar and terrestrial radiative processes, convection and cloud physics, precipitation processes, hydrodynamic equations of motion and large-scale motion of the atmosphere, numerical weather prediction, atmospheric electricity. *Preq:* MATH 1080; and PHYS 2080 or PHYS 2210.
- PHYS 4320\* Optics** 3 (3) Covers a selection of topics, depending on the interest of the student. Topics may include the formation of images by lenses and mirrors, design of optical instruments, electromagnetic wave propagation, interference, diffraction, optical activity, lasers, and holography. Includes Honors sections. *Preq:* PHYS 2210.
- PHYS 4410\* Electromagnetics I** 3 (3) Study of the foundations of electromagnetic theory. Topics include electric fields, electric potential, dielectrics, electric circuits, solution of electrostatic boundary-value problems, magnetic fields, and magnetostatics. Includes Honors sections. *Preq:* PHYS 2210 and MATH 2080.
- PHYS 4420\* Electromagnetics II** 3 (3) Continuation of PHYS 4410. Study of foundations of electromagnetic theory. Topics include magnetic properties of matter, microscopic theory of magnetization, electromagnetic induction, magnetic energy, AC circuits, Maxwell's equations, and propagation of electromagnetic waves. Other topics may include waves in bounded media, antennas, electrodynamics, special theory of relativity, and plasma physics. Includes Honors sections. *Preq:* PHYS 4410.
- PHYS 4450\* Solid State Physics I** 3 (3) Topics include an overview of crystal structures, chemical and atomic bonding, and periodicity in relation to solid materials. Covers electronic, thermal, and magnetic properties of materials, electrical conduction in metals and semiconductors. Overview of the role of electrons and phonons and their interactions is presented. *Preq:* PHYS 2210.
- PHYS 4460\* Solid State Physics II** 3 (3) Continuation of PHYS 4450, including selected topics in solid-state physics such as optical properties, superconductivity, non-crystalline solids, dielectrics, ferroelectrics, and nanomaterials. Plasmons, polarons, and excitons are discussed. Brief introduction into methods of solid-state synthesis and characterization tools is presented. Includes Honors sections. *Preq:* PHYS 4450.
- PHYS 4520\* Nuclear and Particle Physics** 3 (3) Study of our present knowledge concerning subatomic matter. Experimental results are stressed. Topics include particle spectra, detection techniques, Regge pole analysis, quark models, proton structure, nuclear structure, scattering and reactions. Includes Honors sections.
- PHYS 4550\* Quantum Physics I** 3 (3) Discussion of solution of the Schrodinger equation for free particles, the hydrogen atom, and the harmonic oscillator. Includes Honors sections. *Preq:* PHYS 3220 and PHYS 4410.
- PHYS 4560\* Quantum Physics II** 3 (3) Continuation of PHYS 4550. Application of principles of quantum mechanics as developed in PHYS 4550 to atomic, molecular, solid state, and nuclear systems. Includes Honors sections. *Preq:* PHYS 4550.
- PHYS 4650\* Thermodynamics and Statistical Mechanics** 3 (3) Study of temperature development of the laws of thermodynamics and their application to thermodynamic systems. Introduction to low temperature physics is given. Includes Honors sections. *Preq:* Six hours of physics beyond PHYS 2220.

**PHYS 4750\* Selected Topics 1-3 (1-3)** Comprehensive study of a topic of current interest in the field of physics. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of instructor.

**PHYS 4810 Physics of Surfaces 3 (3)** Introduction for advanced undergraduates to the physics and chemical physics of solid surfaces and to the interaction of atoms and molecules with those surfaces. *Preq:* PHYS 3120 and PHYS 3220 and PHYS 3250 and PHYS 3260 and PHYS 4410.

**PHYS 4820 Surface Experiments 3 (2)** Introduction for advanced undergraduates to experimental methods of surface physics. Includes on-hands experience in advanced laboratory. *Preq:* PHYS 3120 and PHYS 3220 and PHYS 3250 and PHYS 3260 and PHYS 4410. *Coreq:* PHYS 4821.

**PHYS 4821 Surface Experiments Laboratory 0 (3)** Non-credit laboratory to accompany PHYS 4820. *Coreq:* PHYS 4820.

**PHYS 4990 Creative Inquiry—Physics and Astronomy 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor.

## PACKAGING SCIENCE

*Professors:* D.K. Cooksey, A.L. Pometto III, R.L. Thomas; *Associate Professors:* D.O. Darby, R.M. Kimmel, W.S. Whiteside; *Assistant Professor:* R.A. Hurley; *Senior Lecturers:* H.P. Batt, R.T. Moore; *Instructor:* G.S. Batt; *Adjunct Professors:* A.L. Brody, R.C. Cooksey, T. Downes, H.J. Park; *Adjunct Associate Professors:* L. Bix, M. Daum, A.C. Seydim, G.L. Smith; *Adjunct Assistant Professors:* R.L. Kaas, A. Rao

**PKSC 1010 Packaging Orientation 1 (1)** Overview of the various principles and practices in packaging science, historical development, packaging as a career.

**PKSC 1020 Introduction to Packaging Science 2 (2)** Considers functions of a package; materials, processes, and technology used in package development; and the relationship of packaging to the corporation, consumer, and society as a whole.

**PKSC 1030 Packaging Science E-Portfolio 1 (1)** Packaging Science majors initiate professional electronic portfolios that showcase their skills and experiences and lead to career e-portfolios. Students demonstrate proficiency in using important software tools; are introduced to Packaging Science faculty, emphasis areas, and targeted library services; and discuss academic integrity. *Preq:* PKSC 1010. *Preq or concurrent enrollment:* PKSC 1020.

**PKSC 2010 Packaging Perishable Products 3 (3)** Covers fundamental characteristics and applications of various materials and systems used to package perishable products such as foods and pharmaceuticals. Discusses packaging issues regarding food, pharmaceutical, and medical packaging. Includes product/package interactions and packaging requirements to address basic theory in food and pharmaceutical protection. *Preq or concurrent enrollment:* CH 2010 and PKSC 2020.

**PKSC 2020 Packaging Materials and Manufacturing 4 (3)** Detailed study of packaging materials including glass, metal, metal foils and sheets, wood, paper, paperboard, plastics, composites, adhesives, coatings, cushioning media; their functional properties in packaging application; laminating and combining of different packaging materials. *Preq:* PKSC 1020. *Coreq:* PKSC 2021.

**PKSC 2021 Packaging Materials and Manufacturing Laboratory 0 (3)** Non-credit laboratory to accompany PKSC 2020. *Coreq:* PKSC 2020.

**PKSC 2030 Packaging Research Fundamentals 2 (2)** Principles, methods, and resources for organizing, researching, and reporting technical work in packaging science. *Preq:* PKSC 1020 and PKSC 1030 and ENGL 1030 and Packaging Science major.

**PKSC 2040 Container Systems (Rigid and Flexible) 3 (3)** Examination of all the packages and containers used to develop systems to distribute products. Compatibility of product and package, structural design, costs, and merchandising considerations are stressed. *Preq:* PKSC 2020. *Coreq:* PKSC 2060.

**PKSC 2060 Container Systems Laboratory 1 (3)** Laboratory practice in sample making, designing and constructing various containers. *Coreq:* PKSC 2040.

**PKSC 2200 Product/Package Design and Prototyping 4 (2)** Overview of structural and graphic development tools for product and packaging design. Focus on digital creation, photo rendering, wide-format plotting/proofing, rapid prototyping, visualization and real-time 2d/3d design. Course utilizes online lectures and hands-on laboratory experience at The Sonoco Institute. *Coreq:* PKSC 2201.

**PKSC 2201 Product/Package Design and Prototyping Laboratory 0 (6)** Non-credit laboratory to accompany PKSC 2200. *Coreq:* PKSC 2200.

**PKSC 2990 Creative Inquiry—Packaging Science 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. To be taken Pass/No Pass only. *Preq:* Consent of faculty member/mentor.

**PKSC 3200 Packaging Design Theory 3 (2)** Study of human factors psychology as it relates to product and package development. Lecture topics center on advanced color theory, space, shape, texture, pattern, typography, branding, marketing, consumer studies, ergonomics, sustainability and applied packaging. Laboratory focuses on developing retail packaging through applying course theory, group development and peer critique. *Preq:* PKSC 2200. *Coreq:* PKSC 3201.

**PKSC 3201 Packaging Design Theory Laboratory 0 (3)** Non-credit laboratory to accompany PKSC 3200. *Coreq:* PKSC 3200.

**PKSC 3680 Packaging and Society 3 (3)** Study of the role of packaging in society as it specifically relates to the responsibilities of the packaging scientist in protecting people and the environment. Includes study of packaging and environmental regulations and guidelines currently in place to achieve these goals. Ability to make informed decisions and ethical judgments is an encompassing goal. Includes Honors sections.

**PKSC 3990 Creative Inquiry—Packaging Science 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. To be taken Pass/No Pass only. *Preq:* Consent of faculty member/mentor.

**PKSC 4010\* Packaging Machinery 3 (3)** Systematic study of types of machinery used to form, fill, seal, and handle various packaging, products, and packaging materials. Emphasizes basic mechanical, electrical, pneumatic, and hydraulic components of packaging machinery along with packaging machinery terminology. Discusses methods for machine line optimization and layout. *Preq:* Packaging Science major or minor; and PKSC 2040; and one of PHYS 2080 or PHYS 2210.

**PKSC 4030 Packaging Career Preparation 1 (1)** Preparation for a successful career in Packaging Science by completing the professional e-portfolio, and finalizing a resume and career e-portfolio. Refines career skills through role playing. Topics include presentations, interviewing, effective collaboration and communication, business and foreign travel etiquette. *Preq:* Packaging Science major or minor. *Coreq:* PKSC 4200.

**PKSC 4040\* Mechanical Properties of Packages and Principles of Protective Packaging 3 (3)** Study of the mechanical properties of products and packages and standard methods of determining these properties. Focuses on the functional properties of packages related to shock and vibration isolation and compression. Includes Honors sections. *Preq:* Packaging Science major or minor and junior standing; and MATH 1060 and PKSC 2040; and one of PHYS 1220 or PHYS 2070.

**PKSC 4090 Total Quality Management for the Food and Packaging Industries 3 (3)** Introduction to the principles of modern quality management emphasizing quality standards and issues and the practices necessary for food processing and packaging companies to survive in a customer-driven marketplace. May also be offered as FDSC 4090.

**PKSC 4160\* Application of Polymers in Packaging 4 (3)** Detailed study of polymer science and engineering as applied to packaging science. Includes polymer morphology, rheology, physical properties, processing methods, and polymerization. Emphasizes relationships among processing, structure, and properties. *Preq:* Packaging Science major or minor; and PKSC 2040 and PKSC 2060; and one of PHYS 1220 or PHYS 2060; and one of CH 2010 or CH 2230. *Coreq:* PKSC 4161.

**PKSC 4161\* Application of Polymers in Packaging Laboratory 0 (3)** Non-credit laboratory to accompany PKSC 4160. *Coreq:* PKSC 4160.

- PKSC 4200\* Package Design and Development 3 (2)**  
Study of the principles and methods practiced in designing and developing packages and packaging systems and of methods used to coordinate and analyze package development activities including interfacing with product development, manufacturing, marketing, purchasing, and accounting. *Preq:* Packaging Science major or minor and second semester Senior standing; and PKSC 3200 and PKSC 3680 and PKSC 4400. *Preq or concurrent enrollment:* PKSC 4010 and PKSC 4040 and PKSC 4160 and PKSC 4300 and PKSC 4540 and PKSC 4640. *Coreq:* PKSC 4030 and PKSC 4201.
- PKSC 4201\* Package Design and Development Laboratory 0 (3)** Non-credit laboratory to accompany PKSC 4200. *Coreq:* PKSC 4200.
- PKSC 4210 Special Problems in Packaging Science 14 (1-4)** Independent research investigations in packaging science related to packaging materials, machinery, design, and applications. Special emphasis is placed on organizing a research proposal, conducting research, and reporting results. May be repeated for a maximum of 15 credits. *Preq:* Consent of instructor.
- PKSC 4220 Selected Topics in Packaging Science 1-3 (1-3)** Comprehensive study of selected topics in packaging science not covered in detail or contained in other courses. Contemporary developments in each area are stressed. May be repeated for a maximum of 15 credits, but only if different topics are covered. *Preq:* Consent of instructor.
- PKSC 4300\* Converting for Flexible Packaging 3 (1)** Study of materials, methods, processes, and equipment used in converting web materials for flexible packaging. Laboratory provides hands-on experience preparing and operating pilot-scale converting equipment. *Preq:* Packaging Science major or minor; and PKSC 2040. *Coreq:* 4301.
- PKSC 4301\* Converting for Flexible Packaging Laboratory 0 (6)** Non-credit laboratory to accompany PKSC 4300. *Coreq:* PKSC 4300.
- PKSC 4400\* Packaging for Distribution 3 (3)** Packages are exposed to various shipping methods and numerous hazards during distribution. To ensure adequate product protection, packaging professionals need to understand the fundamental principles of distribution packaging design. Topics include ASTM and ISTA packaging test methods, packaging design guidelines for distribution, terminology, transport modes, distribution hazards, and protective packaging materials. *Preq:* Packaging Science major or minor; and PKSC 4040.
- PKSC 4540\* Product and Package Evaluation Laboratory 1 (3)** Laboratory experiments to determine properties of packaging materials and to evaluate the response of packages and products to shock, vibration, and compression. Students operate standard testing equipment and become familiar with industry recognized test methods and standards. *Preq:* Packaging Science major or minor. *Preq or concurrent enrollment:* PKSC 4040.
- PKSC 4640\* Food and Health Care Packaging Systems 4 (3)** Characteristics, engineering properties, and applications of various materials and systems used in the packaging of foods, pharmaceuticals, and medical devices. Packaging systems for specific food and medical applications are considered. Laboratory and field exercises on food and medical packaging operations and packaging materials are included. Emphasis is on evaluation methods. Includes Honors sections. *Preq:* Packaging Science major or minor or Food Science major or minor; and one of PKSC 2010 or FDSC 2140; and PKSC 2040. *Coreq:* PKSC 4641.
- PKSC 4641\* Food and Health Care Packaging Systems Laboratory 0 (3)** Non-credit laboratory to accompany PKSC 4640. *Coreq:* PKSC 4640.
- PKSC 4980 Creative Inquiry Laboratory 1-3 (3-9)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams based on laboratory experimentation. Projects may be interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits, but the combined credits earned from PKSC 4980 and 4990 may not exceed eight.
- PKSC 4990 Creative Inquiry—Packaging Science 1-3 (1-3)** Students engage in creative inquiry projects such as surveys or literature research that do not require a laboratory component. Projects may be interdisciplinary in nature. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits, but the combined credits earned from PKSC 4980 and 4990 may not exceed eight.

## PLANT PATHOLOGY

*Professors:* S.N. Jeffers, S.B. Martin, S.W. Scott;  
*Associate Professors:* P. Agudelo, J. Kerrigan

**PLPA 2130 Fungi and Civilization 3 (3)** Overview of how fungi affect the lives of humans, both currently and historically. Addresses the diversity of fungi and the tremendous roles fungi play on the planet with respect to the biological, social and ethical consequences. The general nature of this course makes it beneficial to all students.

**PLPA 3020 Plant Pathology Research 1-3 (1-3)** Research experience in a plant pathology project for undergraduates who understand basic concepts of research. Students develop research objectives, procedures, and collect data. A written report includes interpretation of results. To be taken Pass/No Pass only. Includes Honors sections. *Preq:* Consent of instructor.

**PLPA 3100 Principles of Plant Pathology 3 (2)** Introduction to diseases caused by biotic and abiotic agents, symptom development, diagnosis, economics, control, and relationship of plant diseases to human welfare, including the uses of genetic engineering to develop disease resistant crops. *Preq:* BIOL 1110; or BIOL 1040 and BIOL 1060. *Coreq:* PLPA 3101.

**PLPA 3101 Principles of Plant Pathology Laboratory 0 (3)** Non-credit laboratory to accompany PLPA 3100. *Coreq:* PLPA 3100.

**PLPA 4060\* Diseases and Insects of Turfgrasses 2 (2)** Host-parasite relationships, symptomatology, diagnosis, economics, and control of infectious diseases of turfgrasses and life histories, diagnosis, and control of important insect pests of turfgrasses. May also be offered as ENT 4060. *Preq:* ENT 3010 and PLPA 3100.

**PLPA 4080\* Diseases and Insects of Turfgrasses Laboratory 1 (3)** Laboratory to complement PLPA 4060 or ENT 4060 to learn symptomatology, diagnosis, and control of infectious diseases of turfgrasses and diagnosis of damage caused by important insect pests of turfgrasses. May also be offered as ENT 4080. *Preq:* PLPA 4060 or ENT 4060.

**PLPA 4110\* Plant Disease Diagnosis I 3 (2)** Methods and procedures used in the diagnosis of plant diseases, especially late spring and early summer diseases. Basic techniques of pure culture and identification of plant pathogens and Koch's postulates are taught. Diagnosis of a wide variety of diseases of cultivated and wild plants is carried out. Offered summer session only. *Preq:* PLPA 3100. *Coreq:* PLPA 4111.

**PLPA 4111\* Plant Disease Diagnosis I Laboratory 0 (3)** Non-credit laboratory to accompany PLPA 4110. *Coreq:* PLPA 4110.

**PLPA 4250\* Introductory Mycology 3 (3)** Introduction to the biology of all the groups of fungi and some related organisms, with considerations of the taxonomy, morphology, development, physiology, and ecology of representative forms. May also be offered as BIOL 4250. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Preq or concurrent enrollment:* BIOL 4260 or PLPA 4260.

**PLPA 4260\* Mycology Practicum 2 (1)** Application of the principles of mycological techniques, microscopic study of fungi. Examples from all major groups of fungi are included. May also be offered as BIOL 4260. *Preq or concurrent enrollment:* BIOL 4250 or PLPA 4250. *Coreq:* PLPA 4261.

**PLPA 4261\* Mycology Practicum Laboratory 0 (2)** Non-credit laboratory to accompany PLPA 4260. May also be offered as BIOL 4261. *Coreq:* PLPA 4260.

**PLPA 4540\* Plant Virology 4 (3)** Study of plant viruses: their morphology, biochemistry, purification, and transmission; symptoms resulting from virus infection; virus vector relationships. Serological and nucleic acid hybridization procedures. Diagnosis of viral diseases and the identification of causal agents. Replication of plant viruses, the interaction between viral host and plant genome. Control of plant viral diseases. May also be offered as BIOL 4540. *Preq:* BCHM 3010 or BCHM 3050 or MICR 3050. *Coreq:* PLPA 4541.

**PLPA 4541\* Plant Virology Laboratory 0 (3)** Non-credit laboratory to accompany PLPA 4540. May also be offered as BIOL 4541. *Coreq:* PLPA 4540.

**PLPA 4590\* Plant Nematology 3 (2)** Introduction to nematodes emphasizing plant parasitic nematodes. Introduces morphology of nematodes as it relates to their taxonomic position and ability to cause diseases. Includes diagnosis and control of nematode diseases, along with use of nematodes in studies of molecular interaction and genetics involvement in developing resistance. *Preq:* PLPA 3100. *Coreq:* PLPA 4591.

**PLPA 4591\* Plant Nematology Laboratory 0 (3)**  
Non-credit laboratory to accompany PLPA 4590.  
*Coreq:* PLPA 4590.

**PLPA 4700\* Molecular Plant Pathogen Interactions 3 (3)**  
Study of the interactions of plants and pathogens at the molecular level. Investigates the molecular and genetic components of plant disease and how these can be used for improvement and understanding of how diseases occur and how these can be used for possible disease management. *Preq:* PLPA 3100.

## PORTUGUESE

**PORT 1010 Elementary Portuguese 4 (3)**  
Introduction to speaking, listening, and writing. Attention is given to the sound system of Portuguese to develop basic communication skills.  
*Coreq:* PORT 1011.

**PORT 1011 Elementary Portuguese Laboratory 0 (1)**  
Non-credit laboratory to accompany PORT 1010. *Coreq:* PORT 1010.

**PORT 1020 Elementary Portuguese 4 (3)**  
Continuation of PORT 1010. *Preq:* PORT 1010.  
*Coreq:* PORT 1021.

**PORT 1021 Elementary Portuguese Laboratory 0 (1)**  
Non-credit laboratory to accompany PORT 1020. *Coreq:* PORT 1020.

**PORT 2010 Intermediate Portuguese 3 (3)**  
Intermediate course with more emphasis on communication skills and structure. Reading and writing practice in and outside the classroom, with special attention to idiomatic usage. Introduction to perspectives through readings and cultural activities. *Preq:* PORT 1020.

**PORT 2020 Intermediate Portuguese 3 (3)**  
Continuation of PORT 2010. *Preq:* PORT 2010.

## POLITICAL SCIENCE

*Professors:* X. Hu, W. Lasser, L.R. Olson, J.S. Peake, *Chair;* B.W. Ransom, J.E. Stewart Jr., C.B. Thompson, J.D. Woodard; *Associate Professors:* J.A. Fine, Z. Taydas, A.L. Warber; *Assistant Professors:* K.A. Curtis, D. Frost, S.V. Miller, B.P. Turner; *Senior Lecturers:* V. Matic

**POSC 1010 American National Government 3 (3)**  
Introduction to American national government and politics examining topics such as the Constitution, federalism, political institutions, political behavior, and political participation. Includes Honors sections.

**POSC 1020 Introduction to International Relations 3 (3)**  
Overview of both theory and practice in contemporary global politics. Topics include the structure of and primary actors in the international system; reasons conflict occurs; and roles of international institutions, law, and policy. Includes Honors sections.

**POSC 1030 Introduction to Political Theory 3 (3)**  
Introduction to major themes and thinkers in the Western tradition of political thought. Students examine classic primary texts of the ancient and modern periods, including Plato, Aristotle, Hobbes and Locke, to acquire a working conceptual vocabulary of normative and theoretical terms, political ideologies, and basic patterns of political organization. Includes honors sections.

**POSC 1040 Introduction to Comparative Politics 3 (3)**  
Introduction to the study of comparative politics in the post-Cold War era, with emphasis on theories and applications. Topics include democratic and nondemocratic systems; ideology; political culture; party systems; and legislative, executive, and judicial structures. Includes Honors sections.

**POSC 1990 Introduction to Political Science 1 (1)**  
Introduction to political science as a discipline. Topics include an overview of the subfields within political science, core research methodologies and source materials, and ethical issues related to the study of political science.

**POSC 3020 State and Local Government 3 (3)**  
Introduction to American state and local governments, including examination of nature and scope of non-national governments and their interaction with the U.S. federal system. Emphasis is on structural features, functions, and policies of non-national governments.

**POSC 3050 Creative Inquiry—Political Science 1-3 (1-3)**  
Engages students in faculty-led research projects. May be repeated for a maximum of six credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. *Preq:* Consent of instructor.

**POSC 3100 Political Science Internship 1-3 (1-3)**  
Off-campus internship for at least one semester equivalent. May be repeated for a maximum of three credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor or a Global Politics minor. No more than six hours from POSC 3100, 3110, 3120, 3130 may be applied toward any other degree. *Preq:* POSC 1010 and consent of instructor.

**POSC 3110 Model United Nations 1 (1)**  
United Nations simulation exercises. May be repeated for a maximum of six credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. No more than six hours from POSC 3100, 3110, 3120, 3130 may be applied toward any other degree. *Preq:* Consent of instructor.

**POSC 3120 State Student Legislature 1 (1)**  
State student legislature simulation exercises. May be repeated for a maximum of six credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. No more than six hours from POSC 3100, 3110, 3120, 3130 may be applied toward any other degree.

**POSC 3130 Clemson University Model United Nations Conference 1 (1)**  
Facilitation of annual high school Model United Nations conference held on Clemson campus. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. No more than six hours from POSC 3100, 3110, 3120, 3130 may be applied toward any other degree. *Preq:* Consent of instructor.

**POSC 3210 Public Administration 3 (3)**  
Introduction to public administration, including the elements of organization, personnel and financial management, administrative law, and administrative responsibility. *Preq:* POSC 1010.

**POSC 3410 Quantitative Methods in Political Science 3 (3)**  
Introduction to quantitative research methods in political science. Topics include research design, measurement, data collection, sampling procedures, and applications of statistical techniques to research problems in political science. Also stresses computer use for elementary data analysis. *Coreq:* POSC 3411.

**POSC 3411 Quantitative Methods in Political Science Laboratory 0 (1)**  
Non-credit laboratory to accompany POSC 3410. *Coreq:* POSC 3410.

**POSC 3430 Mass Media in American Politics 3 (3)**  
Role and impact of the mass media in the American political system, emphasizing the media's role in shaping public opinion and in influencing government and public policy. *Preq:* POSC 1010.

**POSC 3560 Social Science of Entrepreneurship 3 (3)**  
Examines those areas of the social sciences that have direct relevance for entrepreneurs. Topics include processes by which entrepreneurs are shaped by social institutions such as the family and community, public policy implications and influences on entrepreneurship, risk perception, decision making, motivation, leadership, and group dynamics. May also be offered as ELE 3560 or PSYC 3560 or SOC 3560. *Preq:* SOC 2010 or SOC 2020 or SOC 2350 or PSYC 2010 or POSC 1010 or POSC 1020 or POSC 1040.

**POSC 3610 International Politics in Crisis 3 (3)**  
Factors contributing to the prevalence of tension and conflict in the contemporary global arena are identified and analyzed, with particular emphasis on political, economic, and military elements. Includes Honors sections. *Preq:* POSC 1020 or POSC 1040.

**POSC 3620 International Organizations 3 (3)**  
Examines normative and institutional foundations of civil society. Explains the formal institutions, decision-making processes, and multilateral capacities of international governmental and nongovernmental organizations. *Preq:* POSC 1020 or POSC 1040.

**POSC 3630 United States Foreign Policy 3 (3)**  
American foreign policy in historical perspective, with particular emphasis on decision-making process, contemporary American capabilities and challenges, and analysis of key issues. *Preq:* POSC 1020 or POSC 1040.

**POSC 3670 Political Risk Assessment 3 (3)**  
Risks associated with conducting business and other activities in different countries, especially in the frequently unstable setting of the developing world. Major commercial providers of country risk assessment are identified and critiqued. *Preq:* POSC 1020 or POSC 1040.

**POSC 3710 European Politics 3 (3)**  
Major emphasis on European governments and issues of importance in the European context. Current methods of comparison are studied and applied to the formal and informal functioning of European governments. *Preq:* POSC 1020 or POSC 1040.

**POSC 3720 Political Culture of East Asia 3 (3)**  
Introduction to political culture that commonly characterizes East Asian countries, with emphasis on political subcultures of different nations, and on the analysis of the mutual influence between politics and culture. *Preq:* POSC 1020 or POSC 1040.

- POSC 3750 European Integration 3 (3)** Survey course analyzing increasing institutional cooperation between European countries with a focus on the European Union. Includes Honors sections. *Preq:* POSC 1020 or POSC 1040.
- POSC 3810 African American Politics 3 (3)** Examination of African American political thought, interests and agenda setting, and dynamics of African Americans' participation in political and governmental decision making. *Preq:* POSC 1010.
- POSC 3820 Spanish-Language News 1 (1)** Weekly discussions of Spanish-language news articles in the foreign press with an emphasis on politics and on the connections among political, economic, social, and cultural trends. Emphasizes Spanish vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. May also be offered as SPAN 3820. *Preq:* SPAN 2020.
- POSC 3830 French-Language News 1 (1)** Weekly discussions of French-language news articles in the foreign press with an emphasis on politics and the connections among political, social, economic, and cultural trends. Emphasizes French vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. May also be offered as FR 3830. *Preq:* FR 2020.
- POSC 3890 Selected Topics 1-3 (1-3)** Study of a selected area of political science. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing.
- POSC 3950 Junior Honors Research Seminar 1 (1)** Readings and discussion to prepare for the Junior Research Paper and the Senior Thesis. *Preq:* Junior standing and membership in Calhoun Honors College.
- POSC 3960 Junior Honors Research 1 (1)** Readings and research in conjunction with an approved political science course at the 3000 or 4000 level. *Preq:* Junior standing and membership in Calhoun Honors College.
- POSC 4030 United States Congress 3 (3)** Examination of the evolution of Congress, congressional elections, the organization of the legislative branch, congressional rules and procedures, decision making, styles of representation, and policymaking. *Preq:* POSC 1010.
- POSC 4050 The American Presidency 3 (3)** Examines the evolution of the presidency, the powers of the chief executive, the public presidency, executive branch organization and staffing, decision making, and political relations with Congress and the federal judiciary. *Preq:* POSC 1010.
- POSC 4070 Religion and American Politics 3 (3)** Examines the impact of religion on American politics, including an analysis of the role of religion in politics, political behavior of major religious groups, constitutional issues and voting behavior. *Preq:* POSC 1010.
- POSC 4090\* Directed Study in American Politics 1-3 (1-3)** Supervised reading/research in selected areas of American politics. May be repeated for a maximum of six credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. *Preq:* Consent of instructor.
- POSC 4100 Directed Study in International Politics 1-3 (1-3)** Supervised reading/research in selected areas of international/comparative politics. May be repeated for a maximum of six credits. No more than three hours from POSC 3050, 3100, 3110, 3120, 3130, 4090, 4100 may be applied toward a Political Science major, minor, or a Global Politics minor. *Preq:* Consent of instructor.
- POSC 4160\* Interest Groups and Social Movements 3 (3)** Empirical and normative examination of the origins, roles, and influence of interest groups and social movements in the United States and of the relationships among interest groups, social movements, and democratic theory. *Preq:* POSC 1010.
- POSC 4210\* Public Policy 3 (3)** Introduction to the major approaches to public policy making in American government. Topics include theories and models of policy making, the identification of policy problems, agenda setting, the formulation and adoption of policy, implementation, and program evaluation. *Preq:* POSC 1010.
- POSC 4230\* Urban Politics 3 (3)** Examines the nature and scope of politics in urban communities and offers an analysis of urban governance, especially in the interaction of public authority and private institutions in metropolitan areas. Emphasis is on the structure, processes, and problems challenging governments in urban America. *Preq:* POSC 1010.
- POSC 4240\* Federalism and Intergovernmental Relations 3 (3)** Introduction to the historical, theoretical, legal, and fiscal aspects of constitutionally divided government. Federal, state, and local division of responsibility for public services is emphasized, along with the emerging devolution of those responsibilities from the federal government to states and localities. *Preq:* POSC 1010.
- POSC 4270\* Public Management 3 (3)** Examination of emerging management problems and issues facing federal, state, and local government and the application of management principles, practices, and techniques of public administration. *Preq:* POSC 1010.
- POSC 4280\* National Security Policy 3 (3)** National security threats and policy decision making. Issues covered include weapons of mass destruction, terrorism, organized crime, narcotics, arms control, intelligence, and homeland security. Students deliberate and assess threat priorities and crisis management. *Preq:* POSC 1020 or POSC 1040.
- POSC 4290\* Global Issues 3 (3)** Analysis, assessment, and management of the principal threats facing global security today. Topics include rogue nations, regional superpowers, alliances, organized crime, illegal weapons proliferation, and corruption. Emphasis is on the strategies available to the international community for dealing with these threats. *Preq:* POSC 1020 or POSC 1040.
- POSC 4300 Public Policy Evaluation 3 (3)** Discussion of the role of policy analysis in government. Applications of analytical and computer tools to substantive policy areas such as transportation, economic/community development, education, poverty, and health. Students focus on assessing a policy from a set of options based on analytic criteria as well as developing policy alternatives. *Preq:* POSC 3410 or STAT 2300 or STAT 3300.
- POSC 4360 Law, Courts, and Politics 3 (3)** Introduces the principal features of the American legal system. Analyzes how and why legal actors and institutions operate as they do. Explores how the law functions as both a tool and an institution of government, as well as how the court system affects the formation and implementation of public policies. *Preq:* POSC 1010.
- POSC 4370\* American Constitutional Law: Rights and Liberties 3 (3)** Examination and analysis of Supreme Court decisions and other legal materials in the areas of civil rights and civil liberties, with an emphasis on freedom of speech, freedom of religion, equal protection of the laws, and privacy rights. *Preq:* Junior standing.
- POSC 4380\* American Constitutional Law: Structures of Government 3 (3)** Examination and analysis of Supreme Court decisions and other legal materials in the areas of national power, federalism, the separation of powers, and the role of the judiciary. *Preq:* Junior standing.
- POSC 4420\* Political Parties and Elections 3 (3)** Study of the distinctive features of the American two-party system with emphasis on presidential elections. Parties are examined as formal organizations, coalitions of voters and interest groups, coordinators of nomination and election processes, and managers of policy-making institutions. *Preq:* POSC 1010.
- POSC 4480\* International Political Economy 3 (3)** Provides students with background knowledge and conceptual tools for understanding the politics of contemporary international economic relations. Students are introduced to the major issues of the international political economy and different perspectives approaching these issues. *Preq:* Sophomore standing.
- POSC 4490 Political Theory of Capitalism 3 (3)** Examines the ethical foundations of capitalism. Focuses primarily on the major ethical theories that have supported or criticized capitalism throughout history. Topics include justification of private property, role of corporations, the profit motive, and the source of wealth creation. *Preq:* POSC 1030.
- POSC 4500 Special Topics in Political Theory 3 (3)** Intensive examination of a selected political philosopher, conceptual area within political theory, or political thought of a particular era. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* POSC 1030.
- POSC 4530 American Political Thought 3 (3)** American political philosophy from the 17th century to the present with emphasis on political and social developments since the 1770s. *Preq:* POSC 1010 or POSC 1030.
- POSC 4540\* Southern Politics 3 (3)** Examination of the unique political environment of the American South, with emphasis on the events and social forces that have shaped politics in the region since World War II. Course material is approached from a variety of perspectives, including history, literature, social themes, and political culture. *Preq:* POSC 1010.
- POSC 4550 Political Thought of the American Founding 3 (3)** Intensive seminar of the principles and practices of America's founders (e.g., Washington, Adams, Jefferson, Madison, and Hamilton). Examines how American revolutionaries struggled between 1765 and 1788 to develop new ideas about rights, liberty, equality, constitutions, republicanism, separation of powers, representation, federalism, etc. *Preq:* POSC 1010 or POSC 1030.

**POSC 4560 Diplomacy: The Art of Negotiation 3** (3) Examines the conduct of foreign policy in the historical and contemporary context. Explores theories and key concepts of international negotiation, offering a comparative look at the behavior and practice of major powers. *Preq:* POSC 1020 or POSC 1040.

**POSC 4570\* Political Terrorism 3** (3) Examination and analysis of the international phenomenon of terrorism in terms of origins, operations, philosophy, and objectives. *Preq:* POSC 1020 or POSC 1040.

**POSC 4580\* Political Leadership 3** (3) Comparative examination of political leaders, focusing particularly on types, methods, and consequences of leadership and on the relationship between leaders and followers. *Preq:* POSC 1010.

**POSC 4590 Ethnic Violence 3** (3) Examination of both theories and case studies of ethnic violence in today's world, with emphasis on understanding potential strategies of conflict resolution. *Preq:* POSC 1020 or POSC 1040.

**POSC 4610\* American Diplomacy and Politics 3** (3) Analyzes the process of making and implementing strategies to protect and promote American national interests. Focuses on the role of government agencies and executive-legislative relations, as well as the participation and influence of interest groups and the media. Includes a five-day seminar in Washington, DC. *Preq:* Consent of instructor.

**POSC 4660 African Politics 3** (3) Comprehensive survey of major regional blocks, as well as analysis of individual states and thematic concepts. *Preq:* POSC 1020 or POSC 1040.

**POSC 4710 Russian Politics 3** (3) Comprehensive examination of the Russian Federation since the fall of the Soviet Union. The successes and failures of democratic transition are analyzed, with topics covering political participation, organized crime and corruption, center-periphery conflict, and ethnic/religious unrest. *Preq:* POSC 1020 or POSC 1040.

**POSC 4720 Japanese Politics 3** (3) Concepts and operation of contemporary Japan's political system. Emphasis is on institution building and political economy after World War II. *Preq:* POSC 1020 or POSC 1040.

**POSC 4730 Eurasian Politics 3** (3) Examination of the areas of the Caucasus and Central Asia, covering themes that include democratization, globalization, terrorism, and stability. *Preq:* POSC 1020 or POSC 1040.

**POSC 4760 Middle East Politics 3** (3) Comprehensive thematic and empirical analysis of the Middle East region. Issues covered include democratization, political and religious freedom, oil, the role of women, and terrorism. States analyzed include Syria, Jordan, Iran, Iraq, Saudi Arabia, Turkey, and the Gulf States. *Preq:* POSC 1020 or POSC 1040.

**POSC 4770 Chinese Politics 3** (3) Concepts and operation of contemporary China's political system; emphasizes institutional innovation and political economy in recent reforms. *Preq:* POSC 1020 or POSC 1040.

**POSC 4780 Latin American Politics 3** (3) Survey of prominent trends in Latin American politics, with a focus on major countries in the region and major issues affecting the region. Relations between Latin America and the United States and other prominent countries are also considered. *Preq:* POSC 1020 or POSC 1040.

**POSC 4800\* Gender and Politics 3** (3) Examination of the role of gender in politics in the United States and in other countries. Particular emphasis on the role of women in electoral politics, issues of gender, women's rights as human rights, and feminist theory. *Preq:* POSC 1010 or POSC 1020 or POSC 1030 or POSC 1040.

**POSC 4820 Political Novel and Film 3** (3) Examination of political novels and films. Emphasizes the development of these media as art forms; the relationship between political novels and films and politics at large; and the role of these media in shaping public opinion. *Preq:* POSC 1010.

**POSC 4850\* Global Affairs and Governments 3** (3) Designed for teachers and education students who wish to learn how to incorporate global affairs more fully into high school curricula. Overview of major topics involving foreign policies and world politics is provided. May also be offered as LANG 4850.

**POSC 4890\* Selected Topics 1-3** (1-3) Intensive examination of a selected area of political science. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Junior standing.

**POSC 4900 Senior Honors Thesis Research 3** (3) Reading and research related to the senior honors thesis. *Preq:* POSC 3960 and Senior standing and membership in Calhoun Honors College.

**POSC 4910 Senior Honors Thesis 3** (3) Research and writing of the senior honors thesis. *Preq:* POSC 4900 and Senior standing and membership in Calhoun Honors College.

**POSC 4990 Professional Development in Political Science 1** (1) Allows students to reflect on their experience as political science majors. Topics include understanding of cross-disciplinary issues, current research in political science, career options, and ethical issues related to the study of political science. To be taken Pass/No Pass only. *Preq:* Senior standing in Political Science.

## PARKS, RECREATION AND TOURISM MANAGEMENT

*Professors:* L.R. Allen, S.J. Backman, R.H. Becker, F.A. McGuire, D.J. Thomason, B.A. Wright, *Chair; Associate Professors:* D.M. Anderson, K.F. Backman, R.D. Bixler, W.C. Norman; *Assistant Professors:* S.G. Arthur-Banning, E.B. Baldwin, A.L. Cory, J.C. Hallo, R.B. Powell, G.P. Ramshaw, D.L. Schmalz; *Lecturers:* D.M. Anderson, R.S. Brookover, L.E. Conrad, R.A. Lucas, A.R. Savedra

**PRTM 1010 Concepts of Leisure 3** (3) Introduces recreation professions and organizations: government, voluntary, and commercial; overviews professional preparation; outlines development of man's uses of leisure and evolution of recreation, city parks, natural resources conservation, and preservation movements as philosophical forces affecting leisure services. Restricted to Parks, Recreation and Tourism Management majors.

**PRTM 1950 Professional Golf Management Seminar I 1** (1) Covers career planning and professional development training needed in the golf industry with special emphasis on topics covered in the PGA/PGM Level I Training Program. *Preq:* PRTM 2810 and consent of instructor.

**PRTM 1980 Creative Inquiry—Parks, Recreation and Tourism Management I 1-4** (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor. *Coreq:* PRTM 1981.

**PRTM 1981 Creative Inquiry—Parks, Recreation and Tourism Management I Laboratory 0** (1-12) Non-credit laboratory to accompany PRTM 1980. *Coreq:* PRTM 1980.

**PRTM 2000 The Profession and Practice in Parks Recreation, and Tourism Management 1** (1) Introduces students to the Parks, Recreation and Tourism Management field. Covers the history and development of the PRTM profession, including professional organizations, current issues and trends, ethical principles and professionalism, and professional competencies and development. To be taken Pass/No Pass only.

**PRTM 2010 The Recreation/Leisure Environment 3** (3) Discusses the development characteristics of built and natural environmental resource settings for recreation, tourism development, and community expression. Examines human/environment interactions during leisure, including the impact of the recreation environment on people and the impact of people on the recreation environment. Surveys public agencies and private interests in these settings. Includes Honors sections.

**PRTM 2050 Program and Event Planning 3** (2) Principles and methods of program development. Time and facility utilization for sports activities, social functions, arts and crafts, outdoor activities, hobbies or special-interest groups, and activities in the cultural and performing arts are pursued. *Preq:* PRTM 1010. *Coreq:* PRTM 2051.

**PRTM 2051 Program and Event Planning Laboratory 0** (2) Non-credit laboratory to accompany PRTM 2050. *Coreq:* PRTM 2050.

**PRTM 2060 Practicum I 1** (3) Students conduct a recreation program in a supervised setting. A minimum of 90 hours with a leisure agency approved by the University is required. To be taken Pass/No Pass only. *Preq:* PRTM 2050 and Sophomore standing in Parks, Recreation and Tourism Management.

**PRTM 2070 Practicum II 1** (3) Continuation of PRTM 2060. Experience in a leisure situation different from the PRTM 2060 exposure. A minimum of 90 hours with a leisure agency approved by the University is required. To be taken Pass/No Pass only. *Preq:* PRTM 2050 and Sophomore standing in Parks, Recreation and Tourism Management.

- PRTM 2100 Serving Diverse Populations in Parks, Recreation and Tourism Management** 3 (3) Introduces students to the leisure patterns and constraints of diverse constituents, including members of ethnic and racial minorities, people of diverse socioeconomic status, women, older adults, people with disabilities, and people with alternative lifestyles. *Preq:* PRTM 1010.
- PRTM 2110 Impacts of Technology and Science in the Context of Play, Recreation and Tourism** 3 (3) Examines the relationship among society, technology, and tourism and recreation. Introduces theories of play, recreation and tourism as they relate to social concerns. Students learn how science and technology have impacted how people play, recreate and travel.
- PRTM 2200 Conceptual Foundations of Parks, Recreation and Tourism** 2 (2) Introduces students to the conceptual foundations of play, recreation, and leisure as they relate to contemporary society, the lifespan, and the natural environment. *Preq:* PRTM 2000.
- PRTM 2210 Delivery Systems for Parks, Recreation and Tourism** 2 (2) Introduces students to the various roles, interrelationships, and importance of leisure service delivery systems in designing and operating programs and facilities to serve diverse populations. Also includes discussion of the role and impact of leisure services and community and economic development. *Preq:* PRTM 2000.
- PRTM 2220 Program and Event Planning in Parks, Recreation and Tourism** 3 (2) Introduces concepts, principles, and skills necessary to plan, implement, and evaluate leisure and recreation programs and events. Topics include assessing needs, developing goals and objectives, selecting programs, events, and resources, marketing, venues, implementation, evaluation, group dynamics and leadership techniques. *Preq:* PRTM 2000. *Coreq:* PRTM 2221.
- PRTM 2221 Program and Event Planning in Parks, Recreation and Tourism Laboratory** 0 (1) Non-credit laboratory to accompany PRTM 2220. *Coreq:* PRTM 2220.
- PRTM 2230 Administration/Management in Parks, Recreation and Tourism** 4 (3) Covers the concepts, principles, and skills of administration/management as they relate to leisure and recreation services. Topics include the fundamental principles of research and data analysis, management, human resources management, supervisory leadership, budgeting and financial management, marketing, professional communication, technology, and facility planning and operations. *Preq:* PRTM 2000. *Coreq:* PRTM 2231.
- PRTM 2231 Administration/Management in Parks, Recreation and Tourism Laboratory** 0 (0) Non-credit laboratory to accompany PRTM 2230. *Coreq:* PRTM 2230.
- PRTM 2240 Legal Aspects of Parks, Recreation and Tourism** 2 (2) Introduces legal foundations and legislative processes, contracts and tort law, regulatory agents and methods of compliance, safety, emergency, and risk management as they relate to recreation, park resources, and leisure services. *Preq:* PRTM 2000.
- PRTM 2260 Foundations of Management and Administration in Parks, Recreation and Tourism Management** 6 (5) Course covers the learning outcomes related to the management and administration of leisure services required for program accreditation by National Recreation and Parks Association. Topics include basic management history and functions, personnel and labor law, marketing, finance, and strategic management as they relate to the Parks, Recreation and Tourism Management field. *Preq:* PRTM 2000 and 2200; or PRTM 3010. *Coreq:* PRTM 2261 and PRTM 2270 and PRTM 2290.
- PRTM 2261 Foundations of Management and Administration in Parks, Recreation and Tourism Management Laboratory** 0 (2) Non-credit laboratory to accompany PRTM 2260. *Coreq:* PRTM 2260.
- PRTM 2270 Provision of Leisure Service Experiences** 5 (4) Course covers the learning outcomes related to the provision of leisure service experiences required for program accreditation by National Recreation and Parks Association. Topics include program design, facilitation, and evaluation as they relate to the Parks, Recreation and Tourism Management field. *Preq:* PRTM 2000 and 2200; or PRTM 3010. *Coreq:* PRTM 2260 and PRTM 2271 and PRTM 2290.
- PRTM 2271 Provision of Leisure Service Experiences Laboratory** 0 (2) Non-credit laboratory to accompany PRTM 2270. *Coreq:* PRTM 2270.
- PRTM 2290 Distributed Competency Integration in Parks, Recreation and Tourism Management** 3 (3) Covers and reinforces critical and creative thinking processes, ethical judgment, oral communication skills, and written communication skills as applied to the Parks, Recreation and Tourism Management field. In addition, students are given refresher/enhancement seminars on spreadsheets, presentation software and word processing software. *Coreq:* PRTM 2260 and PRTM 2270.
- PRTM 2410 Introduction to Community Recreation, Sport and Camp Management** 3 (3) Conceptual examination of community recreation, including the history and structure of public and private nonprofit recreation agencies with an emphasis on programs and services, career opportunities, funding mechanisms, the role of government, and current trends and issues impacting delivery of services. *Preq:* PRTM 1010.
- PRTM 2540 Introduction to Sport Management** 3 (3) Development of a conceptual understanding of sport management, career opportunities in sport management, and the necessary competencies for the different career fields.
- PRTM 2600 Foundations of Recreational Therapy** 3 (3) Examines the history, philosophy, concepts, roles and functions involved in recreational therapy services. Topics include service-delivery models, ethics, standards of practice, credentialing, use of the clinical process in various treatment settings, collaborative interdisciplinary practice and professional behavior specific to therapeutic relationships and practitioner/client interactions. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Coreq:* PRTM 2650.
- PRTM 2650 Terminology in Recreational Therapy Practice** 1 (1) Provides students with the opportunity to learn about the language of health care, including basic term components, medical terms and health care records, and terms associated with body systems. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Coreq:* PRTM 2600.
- PRTM 2700 Introduction to Recreation Resources Management** 3 (3) Fundamentals of recreation resources management are presented to include the framework of management, management of specific resources, management of visitors, and management of services. Includes Honors sections.
- PRTM 2810 Introduction to Golf Management** 3 (2) Development of a conceptual understanding of the golf industry, career opportunities in professional golf management, and specific introductory competencies utilized within the field. *Preq:* Professional Golf Management concentration and consent of instructor. *Coreq:* PRTM 2811.
- PRTM 2811 Introduction to Golf Management Laboratory** 0 (3) Non-credit laboratory to accompany PRTM 2810. *Coreq:* PRTM 2810.
- PRTM 2820 Principles of Golfer Development** 3 (3) Introduction to golf instruction. Provides knowledge and skills necessary to develop successful golf programs. *Preq:* PRTM 2810.
- PRTM 2830 Advanced Methods of Teaching Golf** 3 (3) Provides students with the knowledge and skills necessary to succeed as golf instructors. Particular emphasis is on golf swing mechanics, learning styles and motivation theory, the business of teaching golf, and the use of advanced technology in golf instructions. *Preq:* PRTM 2820.
- PRTM 2950 Professional Golf Management Seminar II** 1 (1) Introduction to the golf industry, professionalism, and current issues of interest in the industry with special emphasis on topics covered in the PGA/PGMED Training Program Level I. *Preq:* PRTM 1950.
- PRTM 2980 Creative Inquiry—Parks, Recreation and Tourism Management II** 1-4 (1-3) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor. *Coreq:* PRTM 2981.
- PRTM 2981 Creative Inquiry—Parks, Recreation and Tourism Management II Laboratory** 0 (1-12) Non-credit laboratory to accompany PRTM 2980. *Coreq:* PRTM 2980.
- PRTM 3010 Recreation and Society** 3 (3) Investigation of the role of recreation in a technological and work-oriented society. Particular emphasis is on recreation behavior, resources, and programming in public and private organizations that serve the public wants. Not open to Parks, Recreation and Tourism Management majors; may not be substituted or otherwise used to meet Parks, Recreation and Tourism Management area requirements. Students must have a 2.0 cumulative grade-point average to enroll in this course.

- PRTM 3040 Challenge Course Facilitation** 3 (2) Develops knowledge and skill in planning, directing, and evaluating group performance in an adventure challenge course environment; emphasis is placed on low and high ropes elements, processing, assessment, safety, and course management. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Coreq:* PRTM 3041.
- PRTM 3041 Challenge Course Facilitation Laboratory** 0 (2) Non-credit laboratory to accompany PRTM 3040. *Coreq:* PRTM 3040.
- PRTM 3050 Safety and Risk Management in Parks, Recreation and Tourism Management** 3 (3) Provisions of safe services, facilities, and activities in the parks, recreation, and tourism domain are studied through the application of germane concepts from the areas of safety, risk management, and liability. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3210 and Junior standing.
- PRTM 3070 Facility Planning and Operations** 3 (3) Introduction to recreation facility planning and operations processes. Design, planning, financing, construction, budgeting, personnel, operating policies and procedures, maintenance, and equipment considerations are covered. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3080 Leadership and Group Processes in Recreation** 3 (3) Leadership is analyzed through experience-based learning. Examines various styles of leadership and communication and their probable consequences. Considers techniques for planning large and small group meetings. Examines literature in the field of leadership and group processes. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3090 Behavioral Concepts in Parks, Recreation and Tourism** 3 (3) Studies social psychological concepts concerning leisure behavior in various park, recreation, and tourism settings. Students learn to apply those theories and behavioral concepts required to understand and manage leisure activities and environments. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 1010 and consent of instructor.
- PRTM 3100 Seminar in Therapeutic Recreation** 1 (1) Examination and discussion related to evidence-based practice in therapeutic recreation settings. *Preq:* PRTM 2000 or PRTM 2060 or PRTM 2070 or PRTM 2200 or PRTM 3110.
- PRTM 3110 Therapeutic Recreation** 3 (3) Examination of the profession of therapeutic recreation by analyzing the history, philosophy, concepts, roles, and functions involved in the therapeutic recreation services. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3170 Group Initiatives** 3 (2) Examination and development of initiative modalities used by therapeutic recreators to teach teamwork, problem-solving communication, goal setting, leadership and personal interaction to diverse populations in a variety of settings. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Coreq:* PRTM 3171.
- PRTM 3171 Group Initiatives Laboratory** 0 (2) Non-credit laboratory to accompany PRTM 3170. *Coreq:* PRTM 3170.
- PRTM 3180 Leisure Lifestyle Management** 3 (3) Examines principles and techniques applicable to guiding disabled as well as nondisabled individuals in an exploration of leisure needs, barriers, consequences, and accessibility. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3200 Recreation Policymaking** 3 (3) Structures and processes for public park and/or recreation policy formation in the United States. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3210 Recreation Administration** 3 (3) Analysis of the internal organization of a recreation department dealing with finances and accounting, records and reports, publicity and public relations, state and federal legislation, staff organization, coordination of community resources. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3080 and Junior standing.
- PRTM 3220 Facilitation Techniques in Recreational Therapy** 3 (3) Covers basic concepts, methods and techniques associated with the selection and implementation of therapeutic facilitation techniques and interventions for use in recreational therapy practice. *Preq:* PRTM 2600. *Coreq:* PRTM 3230 and 3240.
- PRTM 3230 Professional Preparation for Recreational Therapy Practice** 3 (3) Course is designed to prepare students for their recreational therapy field placement experience, as well as assist them in their preparation for job-seeking, job attainment, and career development following graduation. This course provides the academic preparation necessary to ensure entry level skills and determine the preferred placement based on identification of recreational therapy students' career goals. *Preq:* PRTM 2600 and PRTM 2650. *Coreq:* PRTM 3220 and PRTM 3240.
- PRTM 3240 Assessment and Planning in Recreational Therapy** 4 (4) Provides the information and tools for the first two steps of the recreational therapy process: assessment and planning. Through this course, students develop the necessary skills to complete a comprehensive assessment of clients in a therapeutic environment, and develop an appropriate, evidence-based treatment plan. *Preq:* PRTM 2600. *Coreq:* PRTM 3220 and PRTM 3230.
- PRTM 3250 Global Perspectives in Leisure, Recreation and Tourism** 4 (4) Advanced topics in serving diverse populations across the lifespan in Parks, Recreation and Tourism Management. Lifestage, cultural and global perspectives on recreation, and ways in which recreation serves as a tool for coping with issues of development, and appreciation of cultures. *Preq:* Consent of instructor.
- PRTM 3260 Recreational Therapy Implementation and Evaluation: Physical Health Conditions** 3 (3) Examines the various health conditions and the role of recreational therapy in treatment settings for individuals with physical health conditions. In addition, students apply current recreational therapy implementation techniques and evaluation methods across physical health diagnoses and treatment settings. *Preq:* PRTM 3220 and PRTM 3240. *Coreq:* PRTM 3270 and PRTM 3280.
- PRTM 3270 Recreational Therapy Implementation and Evaluation: Mental Health Conditions** 3 (3) Examines the various health conditions and the role of recreational therapy in treatment settings for individuals with mental health conditions. In addition, students apply current recreational therapy implementation techniques and evaluation methods across mental health diagnoses and settings. *Preq:* PRTM 3220 and PRTM 3240. *Coreq:* PRTM 3260 and PRTM 3280.
- PRTM 3280 Preceptorship in Recreational Therapy** 2 (4) Course facilitates experiential learning opportunities for recreational therapy students consisting of preceptor-supervised clinical experiences in health care and community-based agencies. *Preq:* PRTM 3220 and PRTM 3240. *Coreq:* PRTM 3260 and PRTM 3270.
- PRTM 3300 Visitor Services and Interpretation** 3 (3) Introduces the philosophy and principles of the art of environmental interpretation. Comprehensive survey of interpretive theory as it applies to the recreation and parks practitioner and the varying settings within the profession. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3420 Introduction to Tourism** 3 (3) Survey of travel and tourism in the United States with focus on terminology, demographics, financial significance, and trends. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3430 Spatial Aspects of Tourist Behavior** 3 (3) Spatial patterns of national and international leisure travel destinations are explored and analyzed regarding their tourism attractiveness. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3440 Tourism Markets and Supply** 3 (3) Acquaints students with the principles of matching tourism markets and supply. Students examine the strategies used in developing markets. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3450 Tourism Management** 3 (3) Examines the management issues associated with offering tourism products and experiences to travelers by the private and public sectors for the purpose of enhancing visitor opportunities, making a profit and affecting change in a destination.
- PRTM 3460 Heritage Tourism** 3 (3) Heritage is an important part of tourism and can be the focal point of many journeys. Students are introduced to key concepts and issues in heritage tourism, including management of heritage tourism resources, politics of heritage tourism and the relationship between heritage tourism and authenticity.



- PRTM 3470 Sport Tourism 3 (3)** Sport tourism is one of the largest and most important segments of the travel and tourism industry. With a focus on the global sports environment, course introduces students to the fundamentals of sport tourism, including the creation, impacts and future trends of sport tourism development.
- PRTM 3490 Survey of Tourism Sites 1 (3)** On-site study of various exemplary components of the travel and tourism industry in the Southeast. There are additional costs to students to cover travel. To be taken Pass/No Pass only. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3420 and Junior standing in Parks, Recreation and Tourism Management and consent of instructor.
- PRTM 3510 Risk Management and Certifications in Parks, Recreation and Tourism Management 3 (2)** Reviews basics of risk management relative to the administration of recreation programs. Certifies students in Red Cross Wilderness First Aid, First Aid for Sports, and CPR for the Professional Rescuer. *Coreq:* PRTM 3511.
- PRTM 3511 Risk Management and Certifications in Parks, Recreation and Tourism Management Laboratory 0 (2)** Non-credit laboratory to accompany PRTM 3510. *Coreq:* PRTM 3510.
- PRTM 3520 Camp Organization and Administration 3 (3)** Surveys the development and trends of camping in America. Considers programming for the operations of agency and private camps. Enables students to master the techniques of group living. Laboratory offers practical experience in camp craft including trips and outdoor cooking. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3530 Foundations of Camp Counseling 3 (3)** Introduces concepts, principles and skills essential to personnel working within a camp context. Topics include supervising campers, interacting with campers, understanding the developmental needs of campers, and dealing with camper behavior. Group dynamics, leadership techniques and issues such as abuse are also discussed.
- PRTM 3540 Youth Development in Camp 3 (3)** Provides camp professionals with an understanding of concepts and theories in youth development relative to camp settings. Topics include the developmental needs of campers through various ages and stages, activity planning and structure, programming for individuals with disabilities or special medical needs, and creating positive youth development outcomes.
- PRTM 3550 Trends and Issues in Camp Management 3 (3)** Advanced course designed for students to examine the most current principles and practices in the organized camp profession. Topics include evaluation of programs, professional development, fund development, social media and research within a camp context.
- PRTM 3800 Community Recreation in South Carolina 3 (1)** Students study indoor and outdoor recreation facilities, governmental jurisdiction, funding, programming, management, and staffing at community recreation agencies throughout South Carolina during a hands-on five-day field trip. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 1010. *Coreq:* PRTM 3801.
- PRTM 3801 Community Recreation in South Carolina Laboratory 0 (4)** Non-credit laboratory to accompany PRTM 3800. *Coreq:* PRTM 3800.
- PRTM 3830 Golf Shop Operations 3 (3)** Provides students with the knowledge and skills necessary to succeed as managers of golf shops. Particular emphasis is on fundamental business planning, development of policies and procedures, merchandising, inventory control, pricing, and customer service. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2820.
- PRTM 3900 Independent Study in Parks, Recreation and Tourism Management 1-6 (1-6)** Comprehensive studies and investigation of special topics not covered in other courses. Emphasizes field studies, community service, and independent readings. May be repeated for a maximum of six credits. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* Junior standing and consent of instructor.
- PRTM 3910 Selected Topics in Parks, Recreation and Tourism Management 2-3 (2-3)** In-depth examination of developing trends in parks, recreation, and tourism that warrant timely study. May be repeated twice for a maximum of six credits, but only if different topics are covered. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* Junior standing.
- PRTM 3920 Special Event Management 3 (3)** Students acquire an in-depth knowledge about the field of special event management. Planning techniques, strategies, and requirements for planning, implementing, and evaluating community events are included. Emphasizes ordinances, planning, funding, and marketing. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 3950 Professional Golf Management Seminar II 2 (2)** Covers advanced teaching methods, golf club fitting, and player development programs. This course is designed to assist students in gaining the knowledge and skills necessary to successfully complete the PGA/PGM Training Program Level III. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2950.
- PRTM 3980 Creative Inquiry—Parks, Recreation and Tourism Management III 1-4 (1-3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Coreq:* PRTM 3981.
- PRTM 3981 Creative Inquiry—Parks, Recreation and Tourism Management III Laboratory 0 (1-12)** Non-credit laboratory to accompany PRTM 3980. *Coreq:* PRTM 3980.
- PRTM 3990 Introduction to Field Training and Research (Honors) 1 (1)** For students pursuing departmental honors, provides an initial orientation to the internship and research requirements including identification of a faculty mentor to supervise these activities. *Preq:* PRTM 2070 and consent of instructor.
- PRTM 4020 Professional Golf Management Alternative Internship 3 (3)** Under the guidance of a qualified professional supervisor, students gain practical experience and apply knowledge acquired in the classroom to the workplace. May be repeated for a maximum of six credits. *Preq:* PRTM 2060 and PRTM 2070 and PRTM 4040; and Parks, Recreation and Tourism Management major in the Professional Golf Management Concentration; and approval of advisor.
- PRTM 4030 Elements of Recreation and Park Planning 3 (3)** Basic recreation and park planning principles, processes, and trends in area and facility development combine to form the basis for formulation of a relevant knowledge of planning. Students must have a 2.0 cumulative grade-point ratio to enroll in this course. *Preq:* Senior standing.
- PRTM 4040 Field Training I 1 (1)** Preparation for field training experience, including topics such as résumé development, interviewing techniques, internship agency selections, and responsibilities of the student, department, and agency. To be taken Pass/No Pass only. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2060 and consent of instructor. *Preq or concurrent enrollment:* PRTM 2070.
- PRTM 4050 Field Training II 6 (18)** Minimum ten weeks (400 hours) of uninterrupted, supervised work in a park, recreation or tourism management agency. Under agency supervision, students observe, organize, and implement activities, events, and programs. To be taken Pass/No Pass only. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2060 and PRTM 2070 and PRTM 4040; and Senior standing in Parks, Recreation and Tourism Management; and consent of instructor.
- PRTM 4070 Personnel Administration in Parks, Recreation and Tourism Management 3 (3)** Study of personnel administration practices in recreation agencies, including employee selection, training, motivation, rewards, evaluation, and legal issues related to personnel and supervision. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3210.
- PRTM 4080 Honors Internship 6 (18)** Minimum of 4000 hours of uninterrupted, supervised work in a park, recreation, or tourism setting. Written report on observations, special project, or research is required in compliance with a contract between student and course instructor. *Preq:* PRTM 3990 and consent of instructor.
- PRTM 4090 Methods of Recreation Research I 3 (3)** Analysis of the principal methods of recreation research, the application of descriptive statistics to recreation research, and the development of a research proposal. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* STAT 2300 and Senior standing in Parks, Recreation and Tourism Management.
- PRTM 4100 Methods of Recreation Research II 3 (3)** Continuation of PRTM 4090; includes supervised execution and reporting of results of research proposal developed in PRTM 4090 and the application of inferential statistics to research. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 4090 and consent of instructor.

- PRTM 4120 Therapeutic Recreation and Mental Health 3 (3)** Therapeutic recreation services in mental health clinics, institutions, and outdoor settings. Review of disorders and current modes of treatment as they relate to therapeutic recreation. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3110 and consent of instructor.
- PRTM 4160 Leisure and Aging 3 (3)** Examines the role of leisure services in later life, the needs of community-based and institutionalized elderly, and the development of service-delivery systems to meet those needs. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4170 Therapeutic Recreation Processes I 4 (3)** Examination of models, principles, and procedures applicable to comprehensive program planning, specific program plans, individualized care plans, activity analysis, documentation, and evaluation. Students must have a 2.0 cumulative grade-point average and have completed three credit hours of human anatomy and physiology to enroll in this course. *Preq:* PRTM 3110. *Coreq:* PRTM 4171.
- PRTM 4171 Therapeutic Recreation Processes I Laboratory 0 (2)** Non-credit laboratory to accompany PRTM 4170. *Coreq:* PRTM 4170.
- PRTM 4180 Therapeutic Recreation Processes II 4 (3)** Examination of theories and concepts that guide therapeutic recreation interventions, including knowledge and use of communication skills, therapeutic relationships, counseling theories, and group processing techniques. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3110 and PRTM 4170. *Coreq:* PRTM 4181.
- PRTM 4181 Therapeutic Recreation Processes II Laboratory 0 (2)** Non-credit laboratory to accompany PRTM 4180. *Coreq:* PRTM 4180.
- PRTM 4190 Therapeutic Recreation and Aspects of Disability Across the Lifespan 3 (3)** Examination of characteristics and diagnoses of individuals with various disabilities (cognitive, affective, and/or psychomotor domains) across the lifespan. Application of theories and concepts that guide therapeutic recreation interventions as well as examination of disability theory and concepts. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3110 and BIOL 2220 and BIOL 2230.
- PRTM 4200 Therapeutic Recreation Trends and Issues 3 (3)** Advanced principles and practices of therapeutic recreation, including philosophy, ethics, professional development, standards of practice, certification, recreation inclusion, and marketing services. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 4160 and PRTM 4180.
- PRTM 4210\* Recreation Financial Resources Management 3 (3)** Analysis of recreation financial resources management. Deals with revenue sources and their allocation. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3210 and Senior standing in Parks, Recreation and Tourism Management.
- PRTM 4220 Management of Recreational Therapy Services 3 (3)** Presents the foundation for understanding the contemporary health care system, as well as developing systematic program design, implementation and management of recreational therapy services. Students achieve a comprehensive understanding of the insurance and reimbursement systems; relevant guidelines and standards related to health care organizations; the process of program development; and program management principles. *Preq:* PRTM 3260 and PRTM 3270 and PRTM 3280.
- PRTM 4260 Trends and Issues in Recreational Therapy 3 (3)** Capstone course provides insight into the contemporary issues in the recreational therapy profession. The course requires students to synthesize previous course content and experiential learning and appraise personal and professional philosophies to elucidate their role as an entry-level practitioner. *Preq:* PRTM 4220.
- PRTM 4300\* World Geography of Parks and Equivalent Reserves 3 (3)** Major international patterns in the provision and use of urban and rural parks and recreation are examined. May also be offered as GEOG 4300. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4310\* Methods of Environmental Interpretation 3 (2)** Practice and instruction in the use of equipment and methods available to the interpreter in public contact work. Coaching in presentation and evaluation of live programs and in design, execution, and evaluation of mediated programs is the major emphasis. Programs are delivered to public audiences in the Clemson area. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3300 and Senior standing in Parks, Recreation and Tourism Management and consent of instructor. *Coreq:* PRTM 4311.
- PRTM 4311\* Methods of Environmental Interpretation Laboratory 0 (3)** Non-credit laboratory to accompany PRTM 4310. *Coreq:* PRTM 4310.
- PRTM 4410\* Commercial Recreation 3 (3)** Components of offering leisure services and products to the public by individuals, partnerships, and corporations for the purpose of making a profit. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4440\* Tour Planning and Operations 3 (3)** Provides the opportunity to understand the psychology of touring, with emphasis on packaged and group tours and how tours of different types and scale are planned, organized, marketed, and operated. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3420 and consent of instructor.
- PRTM 4450\* Conference/Convention Planning and Management 3 (3)** Provides the opportunity to understand the problems of and solutions to conference and convention planning and management from both the sponsoring organization's and facility manager's perspectives. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4460\* Community Tourism Development 3 (3)** Provides a community-based perspective of organizational, planning, development, and operational needs for a successful tourism economy at the local level. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 3420 and consent of instructor.
- PRTM 4470\* Perspectives on International Travel 3 (3)** Using the United States as a destination, international travel patterns and major attractions are presented. Factors which restrain foreign travel to the United States are analyzed. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4510 Seminar in Community Recreation, Sport and Camp Management 3 (3)** Capstone course of case studies applied to management issues focused on community recreation, sport and camp management. *Preq:* PRTM 2060 and PRTM 2070 and PRTM 4050.
- PRTM 4520 Campus Recreation 3 (3)** Study of the basic components required for administration of successful college union and intramural-recreation sport programs. Students must have a 2.0 cumulative grade-point average to enroll in this course.
- PRTM 4530 Sports Information and Event Management 3 (3)** Introduction to basic techniques, tools, and procedures associated with sports information and event management activities. Focuses on the application of sports information and event management activities building upon knowledge from personal interviews, selected readings, event management brochures and field experience. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2540 and consent of instructor.
- PRTM 4540 Trends in Sport Management 3 (3)** Examination of trends in the sport management area that allows PRTM majors to obtain an updated knowledge base of the field. Students are able to relate their academic studies to the current trends, problems, and management strategies confronting and being used within the sport management industry. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2540 and consent of instructor.
- PRTM 4550 Advanced Program Planning 3 (3)** Advanced recreation programming techniques with an emphasis on funding, outcome measurement, customer service, program development, marketing, specialized populations, and current trends and issues impacting the delivery of recreation programs. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2050.
- PRTM 4600 Leisure Across the Lifespan 3 (3)** Introduces students to ways in which leisure affects human development and human development affects leisure behavior. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2050 and PRTM 3090.
- PRTM 4740 Advanced Recreation Resources Management 3 (3)** Advanced topics in recreation resource management focusing on management strategies and techniques for addressing common resource and social problems in recreation resource management. Case studies and problem analysis are emphasized. Includes Honors sections. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* PRTM 2700 and Senior standing.

**PRTM 4830 Golf Club Management and Operations 3 (9)** Focuses on activities related to merchandising, purchasing and selling, inventory management, vendor selection, pricing strategies, strategies for monitoring sales and inventory related to financial control and customer service. Students are exposed to the responsibilities of a golf professional at a full-service golf club facility. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq or concurrent enrollment:* COOP 1040 and COOP 1050.

**PRTM 4900 Senior Independent Study 1-6 (1-6)** In cooperation with and under supervision of a faculty member, students develop and execute a field study or community project. May be repeated for a maximum of six credits. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* Senior standing and consent of instructor.

**PRTM 4950 Professional Golf Management Seminar IV 1 (1)** Covers golf shop merchandising and inventory management and supervising and delegating. Emphasizes topics covered in the PGA/PGM Training Program Level III checkpoint. Students must have a 2.0 cumulative grade-point ratio to enroll in this course. *Preq:* PRTM 3950.

**PRTM 4980 Creative Inquiry—Parks, Recreation and Tourism Management IV 1-4 (1-3)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of faculty member/mentor. *Coreq:* PRTM 4981.

**PRTM 4981 Creative Inquiry—Parks, Recreation and Tourism Management IV Laboratory 0 (1-12)** Non-credit laboratory to accompany PRTM 4980. *Coreq:* PRTM 4980.

**PRTM 4990 Presentation of Honors Projects 1 (1)** Under direction of a faculty supervisor, students prepare and deliver oral presentations on projects that were carried out in PRTM 4090 or 4100. *Preq:* PRTM 4090 or 4100; and consent of instructor.

## PSYCHOLOGY

*Professors:* T.R. Alley, T.W. Britt, R.L. Campbell, L. Gugerty, B.M. King, R.M. Kowalski, J.A. McCubbin, D.D. Moore, J.W. Murdoch, E.R. Muth, C.C. Pagano, J.J. Pilcher, C.L.S. Pury, P.H. Raymark, *Chair:* R.R. Sinclair, B.R. Stephens, F.S. Switzer III, M.A. Taylor, R.A. Tyrrell; *Associate Professors:* E.G. Brainerd Jr., C. Cantalupo, C.H. Pak, P.J. Rosopa; *Assistant Professors:* P.S. Merritt, M. Shuffler, H.M. Zinzow; *Senior Lecturer:* P.R. Alley, J. Jorgensen

**PSYC 2010 Introduction to Psychology 3 (3)** Introduction to the study of behavior. Analysis of the biological bases of behavior, learning, thinking, motivation, perception, human development, social behavior, and the application of basic principles to more complex phenomena such as education, personal adjustment, and interpersonal relations. Includes Honors sections.

**PSYC 2020 Introductory Psychology Laboratory 1 (2)** Major phenomena and methods of psychology are illustrated and investigated in a series of laboratory modules. Students also explore career and academic development issues.

**PSYC 2500 Pursuing Happiness 3 (3)** Introduces psychological theories and principles used to study human behavior (methods, cognition, motivation, etc.). The concept of happiness is investigated as a psychological construct across cultures. Offered summer only.

**PSYC 2750 Applied Psychology and Transportation 3 (3)** Introduces psychological principles used to study human behavior (methodological, cognitive, perceptual, etc.). These psychological principles, in addition to ethical, legal, and societal perspectives, are applied to transportation issues.

**PSYC 3060 Human Sexual Behavior 3 (3)** The subject of sexual behavior is approached from the psychophysiological, behavioral, and cultural points of view. Evolutionary, historical, and cross-cultural perspectives are considered.

**PSYC 3090 Introductory Experimental Psychology 4 (3)** Introduction to the analysis of data from experimental and correlational research in psychology. Emphasizes the applications and logical nature of statistical reasoning. Laboratory periods stress the techniques of data analysis using microcomputers. *Preq:* PSYC 2010. *Coreq:* PSYC 3091.

**PSYC 3091 Introductory Experimental Psychology Laboratory 0 (2)** Non-credit laboratory to accompany PSYC 3090. *Coreq:* PSYC 3090.

**PSYC 3100 Advanced Experimental Psychology 4 (3)** Continuation of PSYC 3090. Focus is on techniques of empirical research (experiments, quasi-experiments, non-experimental research, etc.) that are widely used in psychology. Students design and carry out their own empirical research projects normally involving data collected from human participants. Extensive practice in the writing of reports is included. *Preq:* PSYC 2010 and PSYC 3090. *Coreq:* PSYC 3101.

**PSYC 3101 Advanced Experimental Psychology Laboratory 0 (2)** Non-credit laboratory to accompany PSYC 3100. *Coreq:* PSYC 3100.

**PSYC 3240 Physiological Psychology 3 (3)** Study of human neuroanatomy with emphasis on the function of the nervous and endocrine systems. Discusses the biological basis of behavior in its normal and abnormal dimensions. *Preq:* PSYC 2010.

**PSYC 3250 Physiological Psychology Laboratory 1 (3)** Demonstrations and techniques of selected physiological procedures are presented to explain the principles discussed in PSYC 3240. *Preq:* PSYC 2010. *Preq or concurrent enrollment:* PSYC 3240.

**PSYC 3300 Motivation 3 (3)** Various aspects of motivation are considered by studying physiological, emotional, and environmental influences on behavior. Orientation is empirical rather than theoretical with emphasis on pertinent research, applications, and measurement of motives. *Preq:* PSYC 2010.

**PSYC 3330 Cognitive Psychology 3 (3)** Study of higher-order mental processing in humans. Topics include memory, learning of concepts, problem solving, and the psychology of language. *Preq:* PSYC 2010.

**PSYC 3340 Laboratory in Cognitive Psychology 1 (2)** Selected experiments and demonstrations are conducted to reveal phenomena related to human perception, memory, reasoning, problem solving, and high-level mental processes. *Preq:* PSYC 2010 and PSYC 3090. *Preq or concurrent enrollment:* PSYC 3330.

**PSYC 3400 Lifespan Developmental Psychology 3 (3)** Survey of current theory and research concerned with the psychological aspects of human growth and development across the entire lifespan. Major topics include developmental methods, physical maturation, cognition, socialization, personality, psycholinguistics, intelligence, learning, behavior problems, and exceptionality. Includes Honors sections. *Preq:* PSYC 2010.

**PSYC 3440 Psychology of Adolescence 3 (3)** Study of the psychosocial processes of adolescence. Major emphasis is on personality development, growth of thinking, social and sexual maturation, and variations in adolescence. *Preq:* PSYC 2010.

**PSYC 3450 Adulthood and Aging 3 (3)** Special consideration of the major psychological processes of aging as they relate to individual behavior and adaptation. Includes the influences of aging on the body, learning and psychomotor skills, thinking and intelligence, employment and productivity, personality, and psychopathology. Opportunity for contact with institutionalized and noninstitutionalized elderly persons is provided. *Preq:* PSYC 2010.

**PSYC 3520 Social Psychology 3 (3)** Survey course analyzing human social behavior from the perspective of the individual as a participant in social relationships. Major emphasis is on the study of such contemporary social processes as attitude formation and change, interpersonal relations, conformity, conflict resolution, aggression and violence, social communication, and group phenomena. Includes Honors sections. *Preq:* PSYC 2010.

**PSYC 3560 Social Science of Entrepreneurship 3 (3)** Examines those areas of the social sciences that have direct relevance for entrepreneurs. Topics include processes by which entrepreneurs are shaped by social institutions such as the family and community, public policy implications and influences on entrepreneurship, risk perception, decision making, motivation, leadership, and group dynamics. May also be offered as ELE 3560 or POSC 3560 or SOC 3560. *Preq:* SOC 2010 or SOC 2020 or SOC 2350 or PSYC 2010 or POSC 1010 or POSC 1020 or POSC 1040.

**PSYC 3640 Industrial Psychology 3 (3)** Reviews perception of work from the pre-industrial revolution to the present. Comparative approaches to motivation, development, maintenance, and attraction of successful work behaviors are discussed. Topics include the organization's responsibilities to the community, implementing a disease- and accident-free workplace, and the effects of consumerism. *Preq:* PSYC 2010.

**PSYC 3680 Organizational Psychology 3 (3)** Analysis of individual behavior for the purpose of investigating problems in organizations and increasing organization effectiveness. Topics include psychological factors affecting communication, decision making, conflict, leadership, work stress, power, and organizational change. *Preq:* PSYC 2010.

**PSYC 3690 Leadership in Organizational Settings 3 (3)** Broad survey of theory and research on leadership in formal organizations. A detailed explanation and critical evaluation of major theories (including participative and charismatic leadership) are bridged with helpful remedies and prescriptions for effective leadership in organizations. *Preq:* PSYC 2010.

- PSYC 3700 Personality 3 (3)** Historical and contemporary views of individual differences in behavior, affect, health, coping, and motivation. Covers topics such as personality development and structure, personality assessment, cross-cultural issues, and applications of personality psychology. *Preq:* PSYC 2010.
- PSYC 3830 Abnormal Psychology 3 (3)** Introduction to the diagnosis and treatment of mental illnesses. Uses current diagnostic standards for mental disorders as a framework for understanding the symptoms, causes, and treatments of the most commonly observed maladaptive behaviors. Includes Honors sections. *Preq:* PSYC 2010.
- PSYC 3900 Honors Seminar in Psychology 3 (3)** Variable topic seminar for Honors students from all majors. Topics are announced prior to registration for each semester. May be repeated once for credit, but only if different topics are covered. *Preq:* PSYC 2010.
- PSYC 4080 Women and Psychology 3 (3)** Explores the wide variety of psychological issues that concern women. Emphasizes empirical research on topics such as motherhood, sex differentiation, motivation, and psychological disorders. *Preq:* PSYC 2010.
- PSYC 4150 Systems and Theories of Psychology 3 (3)** Study of the development of psychology, particularly during the past 1000 years. Emphasis is on giving students a better perspective of present-day psychology. Focus is on the various approaches taken by influential psychologists and the conflicts among these approaches. *Preq:* PSYC 2010.
- PSYC 4220 Sensation and Perception 3 (3)** Study of psychophysical techniques of measurement and sensory and perceptual processes related to vision, hearing, and the other senses. Includes Honors sections. *Preq:* PSYC 2010.
- PSYC 4230 Sensation and Perception Laboratory 1 (2)** Selected experiments are conducted to demonstrate the phenomena involved in sensation and perception. *Preq:* PSYC 3090. *Preq or concurrent enrollment:* PSYC 4220.
- PSYC 4260 Advanced Physiological Psychology 3 (3)** Advanced studies of the biological basis of behavior with emphasis on functional neuroanatomy and endocrinology. Topics may vary. May not be repeated for credit. *Preq:* PSYC 3240.
- PSYC 4350 Human Factors Psychology 3 (3)** Analyses of theoretical issues and research methods related to the interaction between people and machines and human performance. Topics include information processing theory, human control systems and displays, task simulation, perceptual and motor factors limiting human performance. *Preq:* PSYC 2010.
- PSYC 4430 Infant and Child Development 3 (3)** Cognitive, emotional, and social development from conception through childhood (up to age 12). Major theories and research findings are covered. *Preq:* PSYC 2010 and PSYC 3400.
- PSYC 4470 Moral Development 3 (3)** Explores the development of moral reasoning, judgment, and character from a descriptive psychological point of view. Examines the theoretical and empirical work of Jean Piaget, Lawrence Kohlberg, and Elliot Turiel as well as prosocial, eudaemonistic, and cross-cultural alternatives to these ideas. *Preq:* PSYC 2010; and one of PSYC 3400 or PSYC 3440 or PSYC 3450.
- PSYC 4560 Applied Psychophysiology 3 (3)** Explores the various measures used in psychophysiology to study mind-body interactions. Exposes students to the practice of psychophysiology through an integrated hands-on laboratory experience in which students learn about psychophysiological measures by applying them. *Preq:* PSYC 2010.
- PSYC 4710 Psychological Testing 3 (3)** Introduction to the theory of psychological testing, emphasizing the principles of measurement and psychometric characteristics of a good psychological test. Issues in test development, administration, and interpretation are reviewed. Educational, industrial, and clinical uses of tests are examined. *Preq:* PSYC 2010 and 3090.
- PSYC 4750 Brain and Behavior: An Evolutionary Approach 3 (3)** Examines the interactions between the human brain and behavior from an evolutionary perspective. Topics can include: hunger, stress, sleep, sexual attraction, memory, decision making, in-out groups, male-female interaction, and maladaptive behaviors. Includes Honors sections. *Preq:* PSYC 2010 and Junior or Senior standing.
- PSYC 4800\* Health Psychology 3 (3)** Study of the role of health-related behaviors in the prevention, development and/or exacerbation of health problems. Emphasis on the biopsychosocial model and its application in the assessment, treatment, and prevention of health problems. *Preq:* PSYC 2010.
- PSYC 4820 Positive Psychology 3 (3)** Examines the research, theories, and applications of the psychology of human strengths and well-being. Fundamental research into the cultural, emotional, personality, cognitive, motivational, and developmental correlates of strengths and well-being is examined, as well as application of these principles to a variety of organizational settings. *Preq:* PSYC 2010.
- PSYC 4880 Theories of Psychotherapy 3 (3)** Survey of alternative theories of psychological treatment for behavioral and emotional disorders. Various theoretical assumptions, techniques, and applications of each approach are examined and compared, and case examples are considered. *Preq:* PSYC 3700 or PSYC 3830.
- PSYC 4890\* Selected Topics 3 (3)** Seminar in current topics in psychology. Topics change from semester to semester and are announced prior to each semester's registration. May be repeated once for credit, but only if different topics are covered. *Preq:* PSYC 2010.
- PSYC 4900 Senior Division Honors Research I 2-4 (2-4)** Preparation and defense of a research proposal. Proposed project should be empirical, historical, or theoretical in nature. *Preq:* Junior standing and consent of instructor.
- PSYC 4910 Senior Division Honors Research II 2-4 (2-4)** Completion of the proposed research project resulting in a written thesis. *Preq:* PSYC 4900.
- PSYC 4920 Senior Laboratory in Psychology 1 (2)** Students complete an integrative review of topics in psychology in the context of producing a reflective portfolio. *Preq:* Senior standing.
- PSYC 4930 Practicum in Clinical Psychology 3 (1)** Students apply classroom theory in solving individual and community problems through interaction with community agencies and other professional groups in the mental health area. Students have limited but well-controlled contact with actual clinical problems as they occur in the community environment. *Preq:* PSYC 3830. *Coreq:* PSYC 4931.
- PSYC 4931 Practicum in Clinical Psychology Laboratory 0 (5)** Non-credit laboratory to accompany PSYC 4930. *Coreq:* PSYC 4930.
- PSYC 4950 Practicum in Applied Psychology 3 (1)** Students are provided practical experience in the area of applied psychology. Students usually are involved in a project designed to help solve an industrial problem through a direct application of industrial or social psychology. *Preq:* Consent of instructor. *Coreq:* PSYC 4951.
- PSYC 4951 Practicum in Applied Psychology Laboratory 0 (5)** Non-credit laboratory to accompany PSYC 4950. *Coreq:* PSYC 4950.
- PSYC 4970 Directed Studies in Psychology 1-4 (1-4)** Study under the direction of a faculty member of a particular topic agreed upon by the student and faculty member. May be repeated for a maximum of 12 credits. Includes Honors sections. *Preq:* Consent of instructor.
- PSYC 4980 Team-Based Research 1-4 (1-4)** Students conduct psychological research and learn about phases of the research process with a team of their peers under the direction of a faculty member. The collaborative nature of psychological research is emphasized. May be repeated for a maximum of 18 credits. Includes Honors sections. *Preq:* Consent of instructor.

## RELIGION

*Professor:* S.E. Grosby; *Assistant Professor:* B.L. White; *Lecturers:* P.A. Cohen, R. Stephens

- REL 1010 Introduction to Religion 3 (3)** Study of the variety of religious experience and expression in human life.
- REL 1020 World Religions 3 (3)** Survey of major religious traditions of the world. Includes Honors sections.
- REL 3000 Studying Religion: Theories and Methods 3 (3)** Discussion- and presentation-based seminar in which students read the writings of the great theorists of religion since the eighteenth century. Social-scientific, phenomenological, and cultural approaches to the study of religion are explored. Basic methodologies and tools for studying religion are also introduced. *Preq:* Sophomore standing.
- REL 3010 The Old Testament 3 (3)** Survey of the books of the Old Testament with special consideration given to the development of the concepts, institutions, and theology of the ancient Hebrews.
- REL 3020 Survey of New Testament Literature 3 (3)** Study of the books of the New Testament from the standpoint of their occasion, content, literary form, and basic theology.
- REL 3030 The Quran 3 (3)** Survey of Islamic Scripture, its origins, content, and interpretation, with attention to the development of Hadith and Sunna as well.

- REL 3050 Constructing Scripture** 3 (3) Historical exploration of the development of Jewish and Christian scriptures. Emphasis is given to reading texts that were excluded from the Hebrew Bible and the New Testament and the role the canonical played in constructing "orthodoxy."
- REL 3060 Judaism** 3 (3) Examines the development of Judaism from biblical to modern times.
- REL 3070 The Christian Tradition** 3 (3) Examination of the development of Christianity in Western civilization from the post-New Testament period to the present, stressing institutional growth and changes, theological currents, and interaction of Christianity with culture.
- REL 3080 Religions of the Ancient World** 3 (3) Selected religious movements in ancient Mesopotamia, Egypt, Canaan, and the Greco-Roman world with emphasis on movements outside the Judeo-Christian tradition.
- REL 3100 History of Religion in the United States** 3 (3) Development of religion in the U.S. from the Colonial period to the 20th century. Attention is devoted to analyzing the broad currents in religious movements and religious thought that have given shape to the American pluralistic experience. May also be offered as HIST 3100.
- REL 3110 African American Religion** 3 (3) Study of the religious milieu in the U.S. rooted in our African heritage. Background on African tribal religion is included, along with Christian denominations and new religions such as Nation of Islam, Rastafarianism, Voudun, Santeria, and Candomble.
- REL 3120 Hinduism** 3 (3) A study of the history, practices, ideas, and social institutions associated with the variety of Indian religious traditions commonly called "Hinduism" from their origins to the present.
- REL 3130 Buddhism** 3 (3) A study of the history, practices, ideas, and social institutions associated with the variety of Buddhist traditions found throughout the world. Discussion topics focus on the development of classical Buddhism in India and its expansion into Tibet, and includes a treatment of the distinctive developments in China and Japan.
- REL 3140 Buddhism in China** 3 (3) Study of Buddhism in Chinese history since the second century. Examination of the translation and interpretation of the texts, major Chinese Buddhist schools, monastic life, and the comprehensive influence of Buddhism on Chinese culture and society. All readings and discussions are in English.
- REL 3150 Islam** 3 (3) A study of the origins, development, and history of the religion of Islam and Islamic cultures from the time of the Prophet to the present.
- REL 3200 Jesus in History, Faith and Film** 3 (3) An investigation of the genre of ancient biography, the diverse portrayals of Jesus' life in early Christianity, and the post-Enlightenment "Quest for the Historical Jesus." The course also analyzes contemporary cinematic portrayals of Jesus's life as a way of further exploring the relationship between producer, social location, and constructions of the past. *Preq:* Sophomore standing.
- REL 3300 Contemporary Issues in Religion** 3 (3) Examination of a variety of issues of broad concern to scholars of religion today. Issues may vary. May be repeated for a maximum of six credits with departmental consent.
- REL 3510 Ancient Near East** 3 (3) History of the peoples and civilizations of the Near East from the Sumerians to the establishment of Roman power in this region. Includes geography, mythology, religious, and economic currents as well as the methods and discoveries of archaeology. May also be offered as HIST 3510.
- REL 3730 Age of the Protestant Reformation** 3 (3) Evolution of Modern Europe (ca. 1500-1660), as affected by the Reformation, wars of religion, and growth of nation-states. Study includes intellectual advances and the beginnings of European expansion overseas. May also be offered as HIST 3730.
- REL 3990 Junior Research Colloquium** 3 (3) Colloquium offered each spring for junior Religious Studies majors. Students enroll individually with a faculty member of their choice and develop, in consultation with him or her, a research project suited to the student's interests. All students meet four times as a group to present the discuss their research. *Preq:* Junior Religious Studies major.
- REL 4010\* Studies in Biblical Literature and Religion** 3 (3) Critical examination of a selected topic in biblical studies. Topics vary from year to year. May be repeated once for credit.
- REL 4020\* Studies in Religion** 3 (3) Thorough examination of a selected topic in one or more of the religious traditions of the world or of religious life in a particular region. Topics vary from year to year. May be repeated once for credit.
- REL 4100\* Holy Lands** 3-6 (3-6) Rotating study abroad trips to areas of historical importance to Judaism, Christianity, Islam and other religious traditions. Students visit archaeological sites, museums, and sacred spaces of global importance and gain needed world-perspective as they encounter other cultures.
- REL 4520\* History of Early Christianity** 3 (3) Study of the history, social and doctrinal, of early Christianity up to 600 A.D. May also be offered as HIST 4520.
- REL 4900 Senior Seminar** 3 (3) Capstone-style seminar offered each fall for senior year Religious Studies majors, who conduct research, make presentations, and engage in weekly discussions on a topic chosen by the faculty member organizing the seminar. Course represents the final synthesis of skills developed throughout the major. *Preq:* Senior Religious Studies major.
- REL 4970 Religion Honors Research** 3 (3) Students conduct research, clearly define the topic, and complete an annotated bibliography under the supervision of thesis advisor. *Preq:* Consent of department chair and thesis advisor.
- REL 4980 Religion Honors Thesis** 3 (3) In consultation with thesis advisor and departmental thesis committee, students write, revise, defend, and complete their theses. *Preq:* REL 4970 and consent of department chair and thesis advisor.
- REL 4990\* Independent Study** 1-3 (1-3) Study of selected problems, issues, or movements in religion under the direction of a faculty member chosen by the student. Student and faculty member develop an individualized course of study approved by the department chair prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

## RURAL SOCIOLOGY

*Associate Professor:* K.L. Robinson

**RS 3010 Rural Sociology** 3 (3) Study of human social relationships as influenced by life in the open country and in small towns and villages, including considerations of the rural population, rural social institutions, processes of change in agricultural technology, and community area planning and development.

**RS 3030 Methods of Social Research I** 4 (3) Introduction to methods of social research: research design, sampling, measurement, reliability, and validity; the relationship between theory and research. Coordinating laboratory introduces students to computer literacy through research. Required of all Sociology majors. Includes Honors sections. May also be offered as SOC 3030. *Preq:* SOC 2010; and one of MTHS 2030 or MTHS 3010 or EXST 3010. *Coreq:* RS 3031.

**RS 3031 Methods of Social Research I Laboratory** 0 (3) Non-credit laboratory to accompany RS 3030. May also be offered as SOC 3031. *Coreq:* RS 3030.

**RS 4010\* Human Ecology** 3 (3) Analysis of the interrelationships between the physical world, modifications in natural environments, human settlement patterns, and institutions that both encourage and regulate environmental modification. Emphasizes conditions whereby natural resources become public policy concerns. May also be offered as SOC 4010. *Preq:* Junior standing.

**RS 4590\* The Community** 3 (3) Close analysis of the development of contemporary communities and their place in society. Continuing effects of industrialization, migration, and technological change on community location and structure are examined. Structural relations of social class, status, and the associations among institutions are explored. May also be offered as SOC 4590. *Preq:* Junior standing.

**RS 4950 Field Experience** 3 (1) Students participate in selected field placements under supervision for eight hours weekly and in a one-hour seminar per week. May be repeated once for credit. *Preq:* SOC 2010 or SOC 2020; and Junior standing; and consent of instructor. May also be offered as SOC 4950. *Coreq:* RS 4951.

**RS 4951 Field Experience Laboratory** 0 (8) Non-credit laboratory to accompany RS 4950. May also be offered as SOC 4951. *Coreq:* RS 4950.

**RS 4980 Independent Study** 1-3 (1-3) Individual readings or projects in sociological areas not covered in other courses. A written proposal must be approved by the instructor directing the work and by the department chair prior to registration. May be repeated for a maximum of six credits. May also be offered as SOC 4980. *Preq:* Consent of instructor.

**RUSSIAN**

*Professor:* G.L. Love; *Lecturer:* J. Bridgwood

**RUSS 1010 Elementary Russian 4 (3)** Training in pronunciation, grammatical forms, and syntax with a view to giving the student the fundamentals necessary to hold simple conversations and to read simple Russian texts. *Coreq:* RUSS 1011.

**RUSS 1011 Elementary Russian Laboratory 0 (1)** Non-credit laboratory to accompany RUSS 1010. *Coreq:* RUSS 1010.

**RUSS 1020 Elementary Russian 4 (3)** Continuation of RUSS 1010. *Preq:* RUSS 1010. *Coreq:* RUSS 1021.

**RUSS 1021 Elementary Russian Laboratory 0 (1)** Non-credit laboratory to accompany RUSS 1020. *Coreq:* RUSS 1020.

**RUSS 2010 Intermediate Russian 3 (3)** Brief review of RUSS 1010 and 1020 with conversation, composition, and dictation, and the beginning of more serious reading of Russian prose in short stories and plays. Includes Honors sections. *Preq:* RUSS 1020. *Coreq:* RUSS 2011.

**RUSS 2011 Intermediate Russian Laboratory 0 (1)** Non-credit laboratory to accompany RUSS 2010. *Coreq:* RUSS 2010.

**RUSS 2020 Intermediate Russian 3 (3)** Conversation, composition, and dictation based on readings of more difficult Russian prose than in the earlier courses. Includes Honors sections. *Preq:* RUSS 2010. *Coreq:* RUSS 2021.

**RUSS 2021 Intermediate Russian Laboratory 0 (1)** Non-credit laboratory to accompany RUSS 2020. *Coreq:* RUSS 2020.

**RUSS 2970 Creative Inquiry—Russian 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.

**RUSS 3050 Russian Conversation and Composition 3 (3)** Practice in spoken Russian emphasizing vocabulary building, pronunciation, and comprehension. Written exercises promote accuracy. *Preq:* RUSS 2020.

**RUSS 3070 Russian Civilization 3 (3)** Introduction to significant elements of Russian civilization. Emphasis is on social, geographical, political, and artistic aspects of modern Russia. Taught in Russian. *Preq:* RUSS 2020.

**RUSS 3400 Russian Culture of the Nineteenth Century 3 (3)** Study of achievements in art, science, music, and literature in Russia during the 19th century. Taught in English.

**RUSS 3600 Russian Literature to 1910 3 (3)** Study of key texts in the modern literary tradition in Imperial Russia from Pushkin to Chekhov. Readings and lectures are in English.

**RUSS 3610 Russian Literature Since 1910 3 (3)** Study of key texts in modern Russian and Soviet literature with particular focus on Russian modernist movements and Socialist Realism. Readings and lectures are in English.

**RUSS 3970 Creative Inquiry—Russian 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.

**RUSS 3980 Directed Reading 1-3 (1-3)** Directed study of selected works in Russian. May be repeated for a maximum of six credits. *Preq:* RUSS 2020.

**RUSS 4600 Tolstoy and Dostoevsky 3 (3)** Examines a selection of major works by Leo Tolstoy and Fyodor Dostoevsky with particular focus on their literary, political, and philosophical aspects as well as their importance within the modern European literary tradition. Readings and lectures are in English. *Preq:* Junior standing.

**RUSS 4970 Creative Inquiry—Russian 1-4 (1-4)** Continuation of research initiated in RUSS 3970. Students complete their project and disseminate their research results. *Preq:* RUSS 3970.

**SOCIOLOGY**

*Professors:* M.T. Britz, D.K. Sturkie, B.J. Vander Mey, F.C. Mobley, W.M. Wentworth; *Associate Professors:* E.M. Granberg, *Interim Chair:* W.H. Haller, Y. Luo, S.E. Winslow; *Assistant Professor:* A. Whitehead; *Senior Lecturer:* J.L. Holland; *Lecturers:* M. Barr, J. Edwards, S. Southworth, W.C. White

**SOC 2010 Introduction to Sociology 3 (3)** Sociological perspective: the study of contemporary groups, organizations, and societies in terms of human social behavior, social change, social structure, and social institutions. Includes Honors sections.

**SOC 2020 Social Problems 3 (3)** Social problems involving the family, education, health care, political and legal systems, economy, population, environment, community, and special problems associated with age, economics, racial status, and gender inequity.

**SOC 2050 Introductory Sociology Laboratory 1 (3)** Overview of major sociological fields. Examines core competencies and the Sociology major. Relevant career and academic development issues are investigated. E-portfolios are established and expanded. *Preq:* Sociology major. *Preq or concurrent enrollment:* SOC 2010 or SOC 2020.

**SOC 2350 Introduction to Leadership 3 (3)** Introduction to leadership in various organizational settings from a sociological perspective. Examines the concept of leadership, leadership traits, types of leadership, and the evolution of leadership behaviors in the 19th and 20th centuries.

**SOC 3020 Social Research Methods I 3 (3)** This course is the first in a two-semester methods sequence, and focuses on conceptual issues related to research design, and on examples of an array of data collection and analysis techniques. Topics include the research process, linking theory and methods, conceptualization and measurement, sampling, research design, and research ethics. *Preq:* SOC 2010 or SOC 2020. *Preq or concurrent enrollment:* SOC 2050.

**SOC 3030 Methods of Social Research I 4 (3)** Introduction to methods of social research: research design, sampling, measurement, reliability, and validity; the relationship between theory and research. Coordinating laboratory introduces students to computer literacy through research. Required of all Sociology majors. Includes Honors sections. *Preq:* SOC 2010; and one of MATH 2030 or MATH 3010 or STAT 3010. *Coreq:* SOC 3031.

**SOC 3031 Methods of Social Research I Laboratory 0 (3)** Non-credit laboratory to accompany SOC 3030. May also be offered as RS 3031. *Coreq:* SOC 3030.

**SOC 3040 Social Research Methods II 4 (3)** This course is the second in a two-semester methods sequence, and provides a brief review of research design and a concentrated focus on statistical analysis. Topics include organizing and coding data, indexes and scales, measures of central tendency and variability, and univariate, bivariate and multivariate statistics. Includes Honors sections. *Preq:* SOC 3020; and one of STAT 2300 or STAT 3090 or STAT 3300. *Coreq:* SOC 3041.

**SOC 3041 Social Research Methods II Laboratory 0 (1)** Non-credit laboratory to accompany SOC 3040. *Coreq:* SOC 3040.

**SOC 3100 Marriage and Intimacy 3 (3)** Examination of mate selection, living together, marital relations, family planning, conflict resolution, divorce and remarriage, later life adjustments, and singlehood as a lifestyle in the U.S. Includes Honors sections.

**SOC 3110 The Family 3 (3)** Introduction to the family as a social institution. Primary focus is on families in the U.S. with comparisons to other cultures. Topics include history of the family, trends in family formation and dissolution, division of labor, intergenerational relationships, family violence, and policy. Analyses of race, class, and gender are incorporated. Includes Honors sections. *Preq:* SOC 2010 or SOC 2020.

**SOC 3300 Work and Occupations 3 (3)** Introduces changes in the structure of work from preindustrial to postindustrial periods. Topics include the effects of stratification on career decisions, career paths and implications for life changes, social effects of scientific management of work, unionization, globalization, the rise of multinational corporations, and cross-cultural comparisons of management styles. *Preq:* SOC 2010 or SOC 2020.

**SOC 3310 Urban Sociology 3 (3)** Urbanization as a social process and related conditions of work, family structure, social mobility, crime, lifestyle, technology, and development of urban areas in the Third World. *Preq:* SOC 2010 or SOC 2020 and sophomore standing.

**SOC 3500 Self and Society 3 (3)** Social psychology from the sociological viewpoint. Examines interactional and group influences on such individual conditions as childhood and life-course development, language, emotions, motives, sexuality, deviance, and self-concept. *Preq:* SOC 2010 or SOC 2020 or PSYC 2010.

**SOC 3510 Collective Behavior and Social Movements 3 (3)** Spontaneous, transitory, and sporadic group behavior: crowds, panics, riots, fads, and social movements. *Preq:* SOC 2010.

**SOC 3560 Social Science of Entrepreneurship 3(3)** Examines those areas of the social sciences that have direct relevance for entrepreneurs. Topics include processes by which entrepreneurs are shaped by social institutions such as the family and community, public policy implications and influences on entrepreneurship, risk perception, decision making, motivation, leadership, and group dynamics. May also be offered as ELE 3560 or POSC 3560 or PSYC 3560. *Preq:* SOC 2010 or SOC 2020 or SOC 2350 or PSYC 2010 or POSC 1010 or POSC 1020 or POSC 1040.

- SOC 3600 Social Class and Poverty** 3 (3) Overview of economic stratification and inequality. Topics include measuring and explaining inequality, how inequality is reproduced in society, and the consequences for life outcomes. Course also focuses on poverty, including its nature, causes, demographics and consequences. *Preq:* SOC 2010 or SOC 2020.
- SOC 3800 Introduction to Social Services** 3 (3) Fundamentals of casework practice, including philosophy and values, models of group work, and ethics in social services work. *Preq:* SOC 2010 or SOC 2020.
- SOC 3880 The Criminal Justice System** 3 (3) Social systems analysis of criminal justice agencies. Primary focus is on law enforcement and corrections and their interagency relationship with courts and prosecution.
- SOC 3890 Criminology** 3 (3) Study of nature and causes of criminal behavior; societal attempts to control crime; social responses to crime, criminals, and the criminal justice system.
- SOC 3910 Sociology of Deviance** 3 (3) Study of patterns of deviant behavior: subcultures, careers, and life-styles of deviants; deviance theory and research. *Preq:* SOC 2010 or SOC 2020.
- SOC 3920 Juvenile Delinquency** 3 (3) Study of nature, extent, and causes of juvenile delinquency; societal attempts to control delinquent conduct and gang violence; emergence of the juvenile justice system. *Preq:* SOC 2010 or SOC 2020.
- SOC 3940 Sociology of Mental Illness** 3 (3) Mental illness as a social phenomenon, including cultural and social influence, organizational settings of mental health-care delivery, legal issues, patient-therapist relationships, and mental illness intervention as social control. Includes Honors sections.
- SOC 3970 Substance Abuse: Social Causes, Consequences and Treatment** 3 (3) Examination of the history and impact of substance use in our culture, from a sociological perspective. Topics include the various reasons individuals and groups partake of drugs and alcohol, our cultural obsession with substances, theories regarding addiction, drug and alcohol control policy and benefits and costs of substance use. *Preq:* SOC 2010 or SOC 2020.
- SOC 3980 Computer Crime** 3 (3) Traces the history of technological crime and evaluates forensic practices in light of legislation with an analysis of emerging case law. Addresses guidelines for the development of forensic laboratories, the creation of computer crime task forces, search/seizure of electronic equipment, and the evaluation of criminal subcultures. *Preq:* SOC 3880.
- SOC 4010\* Human Ecology** 3 (3) Analysis of the interrelationships between the physical world, modifications in natural environments, human settlement patterns, and institutions that both encourage and regulate environmental modification. Emphasizes conditions whereby natural resources become public policy concerns. Offered spring semester only. May also be offered as RS 4010. *Preq:* Junior standing.
- SOC 4030 Technology, Environment, and Society** 3 (3) Considers issues involved in science, technology, and the environment in relation to human behaviors and values with an emphasis on the U.S. and globalized world contexts. Surveys the sociology of environment, science, and technology. Includes selected analysis of related controversies and policy considerations. *Preq:* SOC 2010 or SOC 2020.
- SOC 4040\* Sociological Theory** 3 (3) Survey of the development of sociological theory. Required of all Sociology majors. *Preq:* SOC 2010 or SOC 2020; and Junior standing.
- SOC 4080 Honors Thesis Research I** 3 (3) Reading and research related to senior honors thesis. Completion of junior honors requirements and approval of department chair and thesis advisor required. *Preq:* Honors status and SOC 3020.
- SOC 4090 Honors Thesis Research II** 3 (3) Research and writing related to the senior honors thesis. *Preq:* Honors status; and honors section of SOC 3040; and SOC 4080.
- SOC 4140\* Policy and Social Change** 3 (3) Uses the sociological perspective to examine policy development, implementation, and evaluation in the public and private sectors. Specifically, focuses on values and ethics and effects of social change efforts on the outcomes of policy formation, social planning, and implementation. *Preq:* SOC 2010 or SOC 2020; and Junior standing.
- SOC 4300 Sociology of Organizations** 3 (3) Analysis of administrative organizations and voluntary associations; applied analysis of their formal and informal group relations, communications, and effectiveness. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4320 Sociology of Religion** 3 (3) Sociological analysis of religious systems and movements and their influence on other social institutions. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4330\* Globalization and Social Change** 3 (3) Examination of the social and historical causes of development and underdevelopment. Various sociological theories of development are reviewed. Selected countries are examined in an international context. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4440 Sociology of Education** 3 (3) Examines the relationship between education and society. Topics include theoretical perspectives, school organization, social mobility and stratification in schools, race and gender, tracking and school reform. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4590\* The Community** 3 (3) Close analysis of the development of contemporary communities and their place in society. Continuing effects of industrialization, migration, and technological change on community location and structure are examined. Structural relations of social class, status, and the associations among institutions are explored. May also be offered as RS 4590. *Preq:* Junior standing.
- SOC 4600\* Race and Ethnicity** 3 (3) Investigation of sociological perspectives on race, ethnic relations, and social stratification. Includes analysis of the impact of social class on minority movements. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4610 Sociology of Sex and Gender** 3 (3) Examination of theoretical and empirical approaches to the sociology of sex and gender, focusing primarily on contemporary American society. Focuses on how gender intersects with race, ethnicity, social class and sexuality, and how major institutions in society are sites for the maintenance and reproduction of gender roles, expectations and differentiation. Includes Honors sections. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4620 Men, Masculinity, and Society** 3 (3) Consideration of masculinity and social order: norms, roles, relationships, and activities; identity and socialization: work, family, sexuality, war, sports, including subcultural comparisons. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4680 Sociology of Criminal Evidence** 3 (3) Introduction to the types of evidence, collection of evidence, chain of custody, and procedures relating to the introduction of evidence into judicial proceedings. Attention is given to Fourth Amendment constitutional issues, the development of law within American boundaries, and the cross-cultural development of law. *Preq:* SOC 3880.
- SOC 4710\* Population Issues and Methods** 3 (3) Study of demographic concepts, theory, and research methods for vital statistics, migration, and population distribution and projections. Considers collection and processing of demographic data and organization of demographic data systems. Offered fall semester only. Includes Honors sections. *Preq:* ANTH 2010 or RS 3010 or SOC 2010 or SOC 2020.
- SOC 4800\* Medical Sociology** 3 (3) Study of socio-cultural factors in the etiology and treatment of physical illness, medical occupations and professions, and the organization of health care delivery systems. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4810\* Aging and Death** 3 (3) Sociological orientation to aging populations focusing on the impact of health care, welfare, and retirement systems. Includes dying as a social phenomenon, suicide, euthanasia, and funerals. *Preq:* SOC 2010 or SOC 2020 and Junior standing.
- SOC 4840\* Child Abuse and Treatment** 3 (3) Comprehensive examination of child abuse, neglect, and exploitation as major social problems; causes, effects, and prevalence of physical, sexual, and emotional maltreatment; definitional controversies; social policy and legal considerations; therapeutic approaches for children and their caretakers; child maltreatment and the judicial system. *Preq:* Junior standing.
- SOC 4860 Creative Inquiry—Sociology** 1-3 (1-3) Investigates topics and engages in action research projects selected by faculty and students. Goals, research, activities, and outcomes vary from semester to semester and project to project. May be repeated for a maximum of 12 credits. *Preq:* Consent of instructor.
- SOC 4910\* The Sociology of Policing** 3 (3) Introduction to the major issues of contemporary policing in the U. S. from a sociological perspective. Topics include the changing functions and structure of policing, the police subculture, and the role of the police in a liberal democracy. *Preq:* SOC 3880.

- SOC 4930\* Sociology of Corrections 3 (3)** Analysis of correctional alternatives. Topics include sentencing strategies and their impact, prison populations (male, female, and juvenile), inmate social structures, treatment and custody issues, community-based alternatives (probation, parole, electronic monitoring, and work release), and correctional management issues. *Preq:* SOC 3880.
- SOC 4940\* Sociology of Organized Crimes 3 (3)** Examines the multifarious aspects of criminal organizations, namely their structure, methods, and networks. Specific topics may include white-collar crime and traditional, nontraditional, and transnational organized crime. *Preq:* SOC 3880.
- SOC 4950 Field Experience 3 (1)** Students participate in selected field placements under supervision for eight hours weekly and in a one-hour seminar per week. May be repeated once for credit. *Preq:* SOC 2010 or SOC 2020; and Junior standing; and consent of instructor. May also be offered as RS 4950. *Coreq:* SOC 4951.
- SOC 4951 Field Experience Laboratory 0 (8)** Non-credit laboratory to accompany SOC 4950. May also be offered as RS 4951. *Coreq:* SOC 4950.
- SOC 4970 Sociology Senior Laboratory 1 (3)** Concludes overview of theory, research, methodology, and fields of sociology. Students add to and finalize complete portfolio, and prepare for post-degree careers and major field test. Students must have a 2.0 cumulative grade-point average to enroll in this course. *Preq:* SOC 2050 with a passing grade and Senior standing.
- SOC 4980 Independent Study 1-3 (1-3)** Individual readings or projects in sociological areas not covered in other courses. A written proposal must be approved by the instructor directing the work and by the department chair prior to registration. May be repeated for a maximum of six credits. May also be offered as RS 4980. *Preq:* Consent of instructor.
- SOC 4990 Seminar in Selected Topics in Contemporary Sociology 3 (3)** Sociological areas of current interest are explored. May be repeated by special arrangement for a maximum of six credits. *Preq:* SOC 2010 or SOC 2020.
- SPANISH**  
*Professors:* C.R. Adams, P.R. Heusinkveld, M.A. Morris; *Associate Professors:* J.K. Hurley, M.M. Rojas-Massei, G.E. Tissera; *Assistant Professors:* L. Dykstra, D.J. Smith; *Lecturers:* B. Del Villar, D. Diaz, X. Gonzalez-Parada, M. Greene, S.K. Harris, L.M. Hernandez, H. Montes, C.A. Robison, R.K. Simpson, S. Tyson, S. Watt, R.G. Unda, M. Zamora
- SPAN 1010 Elementary Spanish 4 (3)** Course for students with no previous experience in Spanish study. The fundamentals of grammar and vocabulary are taught, and a foundation is provided for building oral and written proficiency. Three hours a week of classroom instruction and one hour a week in the language laboratory. *Coreq:* SPAN 1011.
- SPAN 1011 Elementary Spanish Laboratory 0 (1)** Non-credit laboratory to accompany SPAN 1010. *Coreq:* SPAN 1010.
- SPAN 1020 Elementary Spanish 4 (3)** Continuation of SPAN 1010. *Coreq:* SPAN 1021.
- SPAN 1021 Elementary Spanish Laboratory 0 (1)** Non-credit laboratory to accompany SPAN 1020. *Coreq:* SPAN 1020.
- SPAN 1040 Basic Spanish 4 (3)** Condensed first-year course for students who have previously studied Spanish. Upon completion, students are prepared to enter Intermediate Spanish. *Coreq:* SPAN 1041.
- SPAN 1041 Basic Spanish Laboratory 0 (1)** Non-credit laboratory to accompany SPAN 1040. *Coreq:* SPAN 1040.
- SPAN 1510 Spanish for Graduate Students 3 (3)** Intensive program only for graduate students preparing for the reading examination in Spanish. A minimum grade of B on a final examination will satisfy graduate school foreign language requirement. May be repeated once. To be taken Pass/No Pass only. *Preq:* Graduate standing.
- SPAN 2010 Intermediate Spanish 3 (3)** Intermediate course to practice listening, speaking, reading, and writing. Grammatical structures and basic vocabulary are reviewed systematically. Includes literary and cultural perspectives. Includes Honors sections. *Preq:* SPAN 1020. *Coreq:* SPAN 2011.
- SPAN 2011 Intermediate Spanish Laboratory 0 (1)** Non-credit laboratory to accompany SPAN 2010. *Coreq:* SPAN 2010.
- SPAN 2020 Intermediate Spanish 3 (3)** Continuation of SPAN 2010. Includes Honors sections. *Preq:* SPAN 2010. *Coreq:* SPAN 2021.
- SPAN 2021 Intermediate Spanish Laboratory 0 (1)** Non-credit laboratory to accompany SPAN 2020. *Coreq:* SPAN 2020.
- SPAN 2210 Accelerated Spanish II 6 (6)** Accelerated intermediate course that may be taken in lieu of SPAN 2010 and 2020. Through conversation, composition, dictation, and intensive grammar review, proficiency is stressed. Includes literary readings and cultural perspectives. May not be taken by students who have completed SPAN 2010 or 2020. *Preq:* SPAN 1020.
- SPAN 2970 Creative Inquiry—Spanish 1-4 (1-4)** In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Arrangements with faculty members must be established prior to registration. *Preq:* Consent of faculty member.
- SPAN 3020 Intermediate Spanish Grammar and Composition 3 (3)** Intensive review of Spanish structure, verbs, idioms, and vocabulary with an introduction to syntax and stylistics through controlled and free composition. *Preq:* SPAN 2020.
- SPAN 3040 Introduction to Hispanic Literary Forms 3 (3)** Introduction to the basic structures and elements of fiction, poetry, drama, and essay, including literary and critical theory, with readings in 19th- and 20th-century Spanish and Spanish-American literature. *Preq:* SPAN 3020 or SPAN 3050.
- SPAN 3050 Intermediate Spanish Conversation and Composition I 3 (3)** Practice in spoken Spanish with emphasis on vocabulary, pronunciation, intonation, and comprehension. Includes written work to increase accuracy and assignments in the language laboratory. *Preq:* SPAN 2020.
- SPAN 3060 Spanish Composition for Business 3 (3)** Intensive practice of business writing skills through compositions, general review of grammatical structures, and exposure to business vocabulary and concepts. *Preq:* SPAN 2020.
- SPAN 3070 The Hispanic World: Spain 3 (3)** Introduction to the significant aspects of the culture of Spain from its origins to the present. Emphasizes the artistic, social, historical, political, and contemporary issues of the Iberian Peninsula. *Preq:* SPAN 2020.
- SPAN 3080 The Hispanic World: Latin America 3 (3)** Introduction to the significant aspects of the culture of Spanish-American countries. Emphasis is placed on the development of the political, economical, geographical, social, and artistic aspects of Spanish America from the indigenous period to the present. *Preq:* SPAN 2020.
- SPAN 3090 Introduction to Spanish Phonetics 3 (3)** Study of basic concepts of phonetics and phonology, fundamental principles of Spanish pronunciation and International Phonetic Alphabet. *Preq:* SPAN 2020.
- SPAN 3100 CLIP Summer Immersion Program 6 (6)** Conducted entirely in Spanish for eight hours daily. Consists of activities that combine interrelating cultural topics with language skill practice. Frequent opportunities to converse with native speakers during meals and on excursions. Students receive six credits, three of which may be taken in lieu of SPAN 2020. *Preq:* SPAN 2010.
- SPAN 3110 Survey of Spanish-American Literature 3 (3)** Literary movements, influences, authors, and works from the Colonial period to the present. *Preq:* Six credits in Spanish at the 3000 level, including at least one course in literature or culture.
- SPAN 3130 Survey of Spanish Literature I 3 (3)** Literary movements, influences, and authors from the beginning to the end of the 17th century; representative works, discussions. *Preq:* Six credits in Spanish at the 3000 level, including three credits of literature or culture.
- SPAN 3140 Hispanic Linguistics 3 (3)** Familiarizes students with the theory and practice of linguistics applied to Spanish, in order to deepen their knowledge of phonetics, morphology, syntax, semantics and linguistic change. *Preq:* SPAN 3020.
- SPAN 3160 Spanish for International Trade I 3 (3)** Introduction to commercial Spanish; study of the spoken and written language, protocol, and cultural environment of the Spanish-speaking business world. Business vocabulary, basic business and cultural concepts, and situational practice. Reading and analysis of commercial texts. *Preq:* Two 3000-level Spanish language, literature, or culture courses.
- SPAN 3180 Spanish Through Culture 3 (3)** Topic-generated conversation course in Spanish through a broad array of artistic manifestations in the Hispanic World emphasizing conversation and short written exercises. Focuses on one Hispanic culture topic which provides a basis for class discussion and short written compositions in Spanish. *Preq:* One 3000-level course in Spanish.
- SPAN 3820 Spanish-Language News 1 (1)** Weekly discussions of Spanish-language news articles in the foreign press with an emphasis on politics and on the connections among political, economic, social, and cultural trends. Emphasizes Spanish vocabulary as well as cross-cultural contrasts with the United States. May be repeated for a maximum of three credits. May also be offered as POSC 3820. *Preq:* SPAN 2020.



- SPAN 3910 Honors Introduction to Hispanic Literary Forms 1 (1)** One-hour independent study to allow honors students to pursue supervised research on some aspect of Hispanic literature. *Preq:* Membership in Calhoun Honors College.
- SPAN 3920 Survey of Spanish Literature (Honors) 1 (1)** Independent study allowing honors students to pursue supervised research on witchcraft in 15th- and 16th-century Spain. *Preq:* Membership in Calhoun Honors College. *Preq or concurrent enrollment:* SPAN 3130.
- SPAN 3930 The Hispanic World: Latin America (Honors) 1 (1)** One-hour independent study to allow honors students to pursue supervised research on a topic related to Hispanic American history, politics, geography, economics, social institutions, or artistic movements. *Preq:* Membership in Calhoun Honors College. *Preq or concurrent enrollment:* SPAN 3080.
- SPAN 3970 Creative Inquiry—Spanish 1-4 (1-4)** Students focus on a special research area under the guidance of a faculty member. After acquiring the requisite background, students formulate hypotheses for a group project, develop a critical framework, and initiate research on a specific topic.
- SPAN 3980 Directed Reading 1-3 (1-3)** Directed study of selected topics in Spanish literature, language, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- SPAN 4010 New Spanish Fiction 3 (3)** Study of selected readings by popular emerging and established authors of Spain, with emphasis on current cultural trends. Readings include, but are not limited to, detective novels, regional fiction, and fiction from marginalized groups in Spain. *Preq:* SPAN 3000-level literature course.
- SPAN 4030 Spanish American Women Writers 3 (3)** In-depth study of selected literary works by Spanish American women. Representative authors are studied within their philosophical and sociopolitical contexts. *Preq:* Spanish 3000-level literature course.
- SPAN 4040 Nineteenth and Twentieth Century Spanish Literature 3 (3)** Selected readings from major authors in Spain. Emphasis is on readings in poetry, theatre, short story, and novels from the 19th to the early 20th century. *Preq:* Spanish 3000-level literature course.
- SPAN 4050 International Trade, Film, and Literature 3 (3)** Readings and films on the social, economic, and political changes of the Hispanic world. *Preq:* Spanish 3000-level literature or culture course.
- SPAN 4060 Hispanic Narrative Fiction 3 (3)** Topic-generated readings from Spanish America and/or Spain. Readings consider gender issues, the family, ethnicity, religion, politics, history, or socioeconomic issues in the Hispanic world. *Preq:* Spanish 3000-level literature or culture course.
- SPAN 4070 Hispanic Film 3 (3)** Films are read as texts that mirror Hispanic society. Besides learning about cinematographic techniques in Spanish, topics include comparative analysis of film and literature, film as propaganda, film as blockbuster, and the cinematic depiction of social, cultural, and historical realities of Hispanic nations. *Preq:* Spanish 3000-level language, literature, or culture course.
- SPAN 4090 Comprehensive Writing in Spanish 3 (3)** Study of stylistics in addition to grammar review; writing paragraphs, short compositions, and creative papers in Spanish on both fiction and non-fiction topics. *Preq:* Any 3000-level Spanish course.
- SPAN 4110 Advanced Spanish Conversation and Composition 3 (3)** Continuation of SPAN 3050 with emphasis on greater fluency and sophistication in oral and written expression. *Preq:* SPAN 3050.
- SPAN 4150 Spanish for Health Professionals 3 (3)** Medical concepts and terminology in Spanish; designed for students who plan to work in professions related to public health care. *Preq:* Six credits in Spanish at the 3000 or 4000 level.
- SPAN 4160 Spanish for International Trade II 3 (3)** Study of more complex business vocabulary, cultural concepts, and environment of Hispanic markets. Social, political, and economic issues related to Spanish-speaking countries and their current economies in global marketing. Economic geography of Hispanic countries, company organization, management, banking, investment, goods and services, and marketing. *Preq:* SPAN 3160.
- SPAN 4170 Professional Communication 3 (3)** Skill-oriented course, taught in a seminar format. Students learn established protocol for addressing various Spanish-speaking audiences and learn to give professional presentations in Spanish. *Preq:* Spanish 3000-level course.
- SPAN 4180 Technical Spanish for Health Management Professionals 3 (3)** Technical health communication course in Spanish with emphasis on managerial and business aspects of the international health industry. *Preq:* SPAN 4150 and six additional credits in Spanish at the 3000 or 4000 level.
- SPAN 4190 Health and the Hispanic Community 3 (3)** Study of cultural aspects of health and health services in Hispanic populations. Taught in Spanish. *Preq:* Six credits in Spanish at the 3000 or 4000 level.
- SPAN 4200 Hispanic Drama 3 (3)** Exploration of contemporary Hispanic theatre. The production and reception of the plays are analyzed paying particular attention to notions of dramatic genre. Focuses on the change and continuity of the plays as well as their historical, cultural, and ideological backgrounds. *Preq:* Two 3000-level Spanish literature or culture classes.
- SPAN 4210 Spanish-American Modernism and Postmodernism 3 (3)** In-depth study of Spanish-American modernism and postmodernism with focus on narrative and poetry. *Preq:* Any 3000-level Spanish literature course.
- SPAN 4220 The Contemporary Spanish-American Novel 3 (3)** New trends in the development of the Spanish-American novel from the 1940s to the present. *Preq:* Spanish 3000-level literature course.
- SPAN 4230 Advanced Topics in Hispanic Linguistics 3 (3)** Continuation of SPAN 3140 with advanced topics. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* SPAN 3140.
- SPAN 4350 Contemporary Hispanic Culture 3 (3)** Study of social, political, economic, and artistic manifestations of contemporary Hispanic culture. *Preq:* Spanish 3000-level civilization or culture course.
- SPAN 4380 Spanish Honors Research 3 (3)** Individual honors research conducted under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages–Spanish or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing and membership in Calhoun Honors College.
- SPAN 4390 Spanish Honors Thesis 3 (3)** Individual honors research conducted and thesis completed under the direction of Language Department faculty. May not be used to satisfy requirements for the major in Modern Languages–Spanish or Language and International Trade or the minor in Modern Languages. *Preq:* Junior standing and SPAN 4380 and membership in Calhoun Honors College.
- SPAN 4910 Hispanic Narrative Fiction (Honors) 1 (1)** One-hour independent study to allow honors students to pursue supervised research on the sociopolitical climate under Franco's dictatorship, with emphasis on contemporary literary theory. *Preq:* Membership in Calhoun Honors College. *Preq or concurrent enrollment:* SPAN 4060.
- SPAN 4920 Contemporary Latin American Novel (Honors) 1 (1)** One-hour independent study to allow honors students to pursue supervised research in the literary and cinematographic images of magic realism. *Preq:* Membership in Calhoun Honors College. *Preq or concurrent enrollment:* SPAN 4220.
- SPAN 4970 Creative Inquiry—Spanish 1-4 (1-4)** Continuation of research initiated in SPAN 3970. Students complete their project and disseminate their research results. *Preq:* SPAN 3970.
- SPAN 4980 Independent Study 1-3 (1-3)** Directed study of selected topics in Spanish language, literature, and culture. May be repeated for a maximum of six credits. *Preq:* Consent of department chair.
- SPAN 4990 Special Topics 3 (3)** Study of timely or special topics in Spanish. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Consent of department chair.

## EXPERIMENTAL STATISTICS

*Professors:* W.P. Adams, J.R. Brannan, W.C. Bridges, Jr., N.J. Calkin, C.L. Cox, V.J. Ervin, X. Gao, P.D. Gerard, H.S. Hill, Jr., P.C. Kiessler, K.B. Kulasekera, R.B. Lund, G.L. Matthews, W.F. Moss III, J.R. Rieck, D.R. Shier, R.L. Taylor, *Chair:* D.D. Warner, M.M. Wiecek; *Associate Professors:* J. Brown, E.S. Dimitrova, C.M. Gallagher, W. Goddard, J.A. Hoffacker, K.L. James, E.W. Jenkins, T.R. Khan, H.K. Lee, H. Maharraj, C. Park, J.K. Peterson, L. Rebbholz, M.J. Saltzman, X. Sun, C.L. Williams; *Assistant Professors:* P. Belotti, J. Dogbey, B.H. Fralix, Z.S. Hazari, J. Luo, M. Macauley, C.S. McMahan, M. Mitkovski, G.D. Potvin, S. Poznanovikj, M.J. Schmoll, J.L. Sharp, A. Tyminski, H. Xue, J.R. Yoon; *Senior Lecturers:* S.S. Biggers, M.E. Cawood, J.E. Cottingham, T.A. Johnson, R.M. Martinez-Dawson, J.I. McKnew, B.A. Novick, S.A. Prevost, M.A. Reba, D.M. Simms, I.V. Viktorova; *Lecturers:* N. Bannister-Sinwell, E.H. Breazel, R.E. Davidson, C.A. Davis, R.S. Dubsy, E. Gallagher, A.A. Guest, J.M. Hanna, M.L. Hanna, Jr., N. Hubing, J.B. Lassiter, D.A. Moss, J. R. Newton, T.F. Parrott, M. Rios-Adams, L.J. Shick, A.K. Stoddard, T.C. Teitloff, J. Van Dyken, S.E. Walker; *Visiting Professor:* J.D. Fulton; *Visiting Assistant Professor:* N.L. Chenette; *Visiting Lecturers:* N. Hubing, A. Keaton, P.P. King

**STAT 2220 Statistics in Everyday Life 3 (3)**

Focuses on the role of statistics in a variety of areas including politics, medicine, environmental issues, advertising, and sports. Students explore common statistical misconceptions and develop an understanding of how principles of probability and statistics affect many aspects of everyday life. Not open to students who have received credit for MATH 3020, or STAT 3090. *Preq:* Any MATH course or a score of 50 or higher on the Clemson Mathematics Placement Test.

**STAT 2300 Statistical Methods I 3 (2)**

Basic concepts and methods of statistical inference; organization and presentation of data, elementary probability, measures of central tendency and variation, tests of significance, sampling, simple linear regression and correlation. Stresses the role of statistics in interpreting research and the general application of the methods. Statistical microcomputer software is used. Not open to students who have received credit for MATH 3020 or STAT 3090. Includes Honors sections. *Preq:* Any MATH course or STAT 2220 or a 65 or better on the Clemson Mathematics Placement Test. *Coreq:* STAT 2301.

**STAT 2301 Statistical Methods I Laboratory 0 (2)**

Non-credit laboratory to accompany STAT 2300. *Coreq:* STAT 2300.

**STAT 3090 Introductory Business Statistics 3 (3)**

Introductory probability and statistics for business students, particularly those who will take MGT 3100. Topics include descriptive statistics, probability, expectations, binomial, normal, sampling distributions, one and two sample estimation and testing. *Preq:* MATH 1060 or MATH 1070 or MATH 2070 or MATH 2100.

**STAT 3300 Statistical Methods II 3 (3)**

Principle topics include collecting and summarizing data, probability distributions, analysis of categorical data, introduction to multiple linear regression, experimental design, analysis of variance, and non-parametric methods. Statistical computer software is used. Not open to students who have received credit for MATH 4020. *Preq:* MATH 3020 or STAT 2300.

**STAT 4020\* Introduction to Statistical Computing 3 (3)**

Introduction to statistical computing packages. Topics include data importation, basic descriptive statistic computation, basic graphic preparation, and statistical analysis methods and procedures. *Preq:* STAT 2300.

**STAT 4110\* Statistical Methods for Process Development and Control 3 (3)**

Experimental design techniques for use in process development, application of screening experiments and response surface experiments, techniques for process control with implications for product quality control. Includes discussions of the use of statistical computer analyses and interpretations including computer-generated graphics. *Preq:* MATH 2060.

**STAT 4620 Statistics Applied to Economics 3 (3)**

Continuation of STAT 3010 emphasizing statistical methods used in the collection, analysis, presentation, and interpretation of economic data. Special attention is given to time-series analysis, the construction of index numbers, and the designing of samples for surveys in the social science fields. *Preq:* STAT 2300.

**SCIENCE AND TECHNOLOGY IN SOCIETY****STS 1010 Survey of Science and Technology in Society 3 (3)**

Surveys historical, philosophical, and social studies of science; introduces the basic requisites for scientific and technological literacy; and considers the problems of responsible participation in a scientifically and technologically advanced society.

**STS 1020 Ideas, Machinery, and Society 3 (3)**

Interdisciplinary discussion course introducing the fundamental themes of STS: the influence of social groups on the development of science and technology and the effects of science and technology on society.

**STS 1200 Topics in Science and Technology in Society 3 (3)**

Explores ethical, policy and social issues raised by the complex interactions among science, technology and society. Topics vary depending on the instructor.

**STS 1710 Scientific Skepticism 3 (3)**

Investigation of unusual phenomena using scientific methodology. Explores the interplay of science, pseudoscience, and society through development of critical thinking skills. Discussion-oriented course that focuses on case studies of extraordinary claims.

**STS 2150 A Critical Approach to the Global Challenge of Technological Revolutions 3 (3)**

This course takes a broad, humanistic perspective for understanding the challenges posed by scientific and technological revolutions, including innovations like nanotechnology, environmental preservation, bio-technology, digital technology, and nuclear fusion. Students learn skills and strategies for thinking critically about the nature of radical change in science and technology as it affects society.

**STS 2160 Critical Analysis of a Current STS Issue 3 (3)**

Critical analysis of a current science and technology issue with significant controversial and societal consequences (e.g., global warming, methods of energy production). Students retrieve, analyze, evaluate, present and discuss relevant information to develop basic competence in science and mathematics and in the evaluation of scientific and technological issues. May be repeated for a maximum of six credits, but only if different topics are covered. *Preq:* Sophomore standing.

**STS 3010 Science in Context 3 (3)**

Develops an understanding of the social character of scientific activity. Through the study of current work by leading historians, sociologists, and philosophers of science, students develop a comprehensive grasp of the social foundations of modern scientific inquiry.

**STS 3030 Technology, Culture and Society 3 (3)**

Addresses issues that arise from the interaction of technology with its social and cultural context. To better understand how technologies relate to societies and cultures, students learn to use the analytic tools required to evaluate the significance of technology, as well as its relations to social endeavors and cultural endeavors.

**STS 4980 Creative Inquiry 1-3 (1-3)** Students conduct research into Science and Technology in Society with a team of their peers under the direction of a faculty member. The collaborative character of research in science and technology in society is emphasized. Includes Honors sections. May be repeated for a maximum of 12 credits.

**STS 4990 Independent Study 1-3 (1-3)** Study of selected topics under direction of a faculty member selected by the student. Student and faculty member develop a course of study designed for the individual student and approved by the STS program coordinator prior to registration. May be repeated for a maximum of six credits. Students are expected to have completed their General Education Science and Technology in Society Requirement before enrolling in this course. *Preq:* Consent of instructor.

**THEATRE**

*Professors:* D.J. Hartmann, *Chair; Associate Professors:* K.L. Johnson, A.M. Penna, S. Robert; *Assistant Professor:* K. Seymour, R. St. Peter; *Lecturers:* J. Adkins, C. Collins

**THEA 1950 Creative Inquiry—Theatre 1-4 (1-4)**

In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**THEA 2100 Theatre Appreciation 3 (3)**

Examination of the theatre event approached through historical context, play reading, analysis of production practices, and field trips to live dramatic performances. Includes Honors sections.

**THEA 2670 Stage Makeup Techniques 3 (2)**

Practical study of basic stage makeup techniques for the acting student including corrective makeup, modeling with paint, three-dimensional makeup, prosthesis with latex, and makeup for other media. *Coreq:* THEA 2671.

**THEA 2671 Stage Makeup Techniques Laboratory 0 (1)**

Non-credit laboratory to accompany THEA 2670. *Coreq:* THEA 2670.

**THEA 2770 Production Studies in Theatre 3 (3)**

Study of technical production and design including scenery, costume, and lighting through the examination of plays in production.

**THEA 2780 Acting I 3 (2)**

Fundamentals of acting; basic stage techniques; exercises in interpretation, improvisation, characterization; experience in supervised scene study. *Coreq:* THEA 2781.

**THEA 2781 Acting I Laboratory 0 (3)**

Non-credit laboratory to accompany THEA 2780. *Coreq:* THEA 2780.

**THEA 2790 Theatre Practicum 1 (3)**

Practical work in theatre on a production designed for public presentation. May be repeated for a maximum of our credits.

**THEA 2880 Introduction to Computer-Aided Drafting 3 (2)**

Introduction to the basics of computer-aided drafting. Software applications include AutoCAD, Vectorworks, and WYSWYG. *Coreq:* THEA 2881.

- THEA 2881 Introduction to Computer-Aided Drafting Laboratory** 0 (3) Non-credit laboratory to accompany THEA 2880. *Coreq:* THEA 2880.
- THEA 2950 Creative Inquiry—Theatre** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. Creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.
- THEA 3080 Survey of Broadway Musicals I** 3 (3) Introduction to Broadway musical repertoire from the Golden Age of Broadway: 1943-1964. Emphasizes the music with attention to production detail, historical perspective, and social milieu. May also be offered as MUSC 3080.
- THEA 3090 Survey of Broadway Musicals II** 3 (3) Survey of Broadway musical repertoire from new conceptual shows from 1965 to the present day. Emphasizes the music with attention to production detail, historical perspective, and social milieu. May also be offered as MUSC 3090.
- THEA 3150 Theatre History I** 3 (3) Historical survey of Western and non-Western theatre. Emphasis is placed on the changing roles of the playwright, director, actor, technician, and spectator from antiquity to the Renaissance. *Preq:* Sophomore standing.
- THEA 3160 Theatre History II** 3 (3) Historical survey of Western theatre. Emphasis is placed on the changing roles of the playwright, director, actor, technician, and spectator from the Renaissance to the present. *Preq:* Sophomore standing.
- THEA 3170 African-American Theatre I** 3 (3) Acquaints students with the origin and development of African-American playwrights, plays, players, and their contributions to the American theatre from the 19th century to the Civil Rights Movement.
- THEA 3180 African-American Theatre II** 3 (3) Acquaints students with the development of African-American playwrights, plays, players, and their contributions to the American theatre from the Black Arts Movement to the present.
- THEA 3290 Musical Theatre Vocal Performance** 3 (2) Trains singers-actors in musical theatre repertoire. A study of repertoire via master classes, individual instruction, research of the historical context of Broadway music, studio performance, observation, and peer evaluation, culminating in a public showcase performance. May also be offered as MUSC 3290. *Coreq:* THEA 3291.
- THEA 3291 Musical Theatre Vocal Performance Laboratory** 0 (2) Non-credit laboratory to accompany THEA 3290. May also be offered as MUSC 3291. *Coreq:* THEA 3290.
- THEA 3470 The Structure of Drama** 3 (3) Introduction to the creative writing and critical study of drama.
- THEA 3500 Applied Theatre for Business and Industry I** 3 (3) Principles and practices from theatre to address social and educational issues in a wide range of settings, including teaching, justice, healthcare, political and community development; applying critical thinking and problem solving with theatre as a vehicle to develop plans for varying business approaches and models.
- THEA 3670 Costume Technology** 3 (2) Theory and practice of costume technology including equipment, patterning, fabric identification, cutting, construction, and fitting. *Coreq:* THEA 3671.
- THEA 3671 Costume Technology Laboratory** 0 (3) Non-credit laboratory to accompany THEA 3670. *Coreq:* THEA 3670.
- THEA 3680 Voice for the Stage** 3 (2) Study of the principles of vocal production and standard American speech for the stage; exercises in breath support and projection, improving tonal quality, and elimination of regional dialects through the study of the International Phonetic Alphabet. *Preq:* THEA 2780. *Coreq:* THEA 3681.
- THEA 3681 Voice for the Stage Laboratory** 0 (3) Non-credit laboratory to accompany THEA 3680. *Coreq:* THEA 3680.
- THEA 3720 Creative Drama** 3 (3) Practical applications using creative drama as a learning tool to strengthen group collaboration and creative goals. Students develop strategies for workshop designs in varying settings with focus toward exploration, discovery and broadened perspectives toward group and individual creative practice.
- THEA 3740 Stage Movement for Actors** 3 (1) Study of the psychological and physical sources of movement in the human body, with emphasis on the attainment of intellectual and physical control and the application of the skills to the development of a role. *Preq:* THEA 2780. *Coreq:* THEA 3741.
- THEA 3741 Stage Movement for Actors Laboratory** 0 (1) Non-credit laboratory to accompany THEA 3740. *Coreq:* THEA 3740.
- THEA 3760 Stage Directing I** 3 (2) Directing and staging techniques for the proscenium stage; exercises in composition, movement, picturization; experience in direction of scenes. *Preq:* Sophomore standing and either THEA 2770 or THEA 2780. *Coreq:* THEA 3761.
- THEA 3761 Stage Directing I Laboratory** 0 (3) Non-credit laboratory to accompany THEA 3760. *Coreq:* THEA 3760.
- THEA 3770 Stagecraft** 3 (2) Theory and practice of stage design and technology. *Preq:* Sophomore standing. *Coreq:* THEA 3771.
- THEA 3771 Stagecraft Laboratory** 0 (3) Non-credit laboratory to accompany THEA 3770. *Coreq:* THEA 3770.
- THEA 3790 Acting Ensemble** 1 (3) Performance opportunities in the area of theatre for young audiences. Students are members of a theatrical touring troupe and perform in a variety of spaces and locations. May be repeated for a maximum of four credits. *Preq:* Consent of instructor by way of audition only.
- THEA 3880 Stage Management** 3 (3) Examines the vital part stage managers play in every theatrical production including organizing rehearsals, facilitating communication between director and designers, and calling cues during performances. Introduces the art and craft of stage management by incorporating Performing Arts Department and Brooks Center productions.
- THEA 3950 Creative Inquiry—Theatre** 1-4 (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.
- THEA 3980 Special Topics in Theatre** 3 (3) Select areas of study in theatre not addressed by other theatre course offerings. May be repeated once. *Preq:* Consent of instructor.
- THEA 4290\* Dramatic Literature I** 3 (3) Selected reading in the dramatic literature from the classical era of Greece and Rome to the Renaissance. *Preq:* ENGL 3100. May also be offered as ENGL 4290.
- THEA 4300\* Dramatic Literature II** 3 (3) Principles and progress of drama from the Restoration to the present; analysis of representative plays; critical reports; discussion of trends in dramatic literature. *Preq:* ENGL 3100. May also be offered as ENGL 4300.
- THEA 4470\* Playwriting Workshop** 3 (3) Workshop in the creative writing of plays. May be repeated once. *Preq:* ENGL 3470 or THEA 3470. May also be offered as ENGL 4470.
- THEA 4500 Applied Theatre for Business and Industry II** 3 (3) Advanced projects to address social and educational issues using theatre as a vehicle to develop portfolio material and specialized business approaches relative to individual fields of study. *Preq:* THEA 3500.
- THEA 4670 Costume Design** 3 (3) Theory and practice of costume design for the theatre including the study of production concept and styles, sketching, and rendering.
- THEA 4720\* Improvisation** 3 (3) Practical applications using drama to motivate collaboration, heighten analytical skills, and strengthen group thinking and processing skills. Explorations include workshop design and leadership among various venues and participant groups, honing strengths toward positive and creative problem-solving. Techniques include strategies for writers, actors, directors, visual artists, teachers, and workshop leaders.
- THEA 4760 Stage Directing II** 3 (2) Continued study in the art of stage directing emphasizing historical and contemporary theory and methodology with a focus on special topics. *Preq:* THEA 3760. *Coreq:* THEA 4761.
- THEA 4761 Stage Directing II Laboratory** 0 (3) Non-credit laboratory to accompany THEA 4760. *Coreq:* THEA 4760.
- THEA 4770 Stage Design** 3 (2) Study and practice in stage design, including drafting, graphics, drawing, rendering, scene painting, and light plotting. *Preq:* THEA 3770. *Coreq:* THEA 4771.
- THEA 4771 Stage Design Laboratory** 0 (3) Non-credit laboratory to accompany THEA 4770. *Coreq:* THEA 4770.
- THEA 4790 Acting II** 3 (2) Continued study in the craft of acting for contemporary Western theatre. Students focus on monologue and scene study in a variety of performance settings. *Preq:* THEA 2780. *Coreq:* THEA 4791.

**THEA 4791 Acting II Laboratory 0** (3) Non-credit laboratory to accompany THEA 4790. *Coreq:* THEA 4790.

**THEA 4800 Advanced Scene Study for Actors 3** (2) Students interpret and perform in complex plays written in heightened styles and integrating period movement into the various genres and styles of plays throughout major periods of theatre history. Styles include Elizabethan, Comedy of Manners, and early Realism. *Preq:* THEA 4790. *Coreq:* THEA 4801.

**THEA 4801 Advanced Scene Study for Actors Laboratory 0** (3) Non-credit laboratory to accompany THEA 4800. *Coreq:* THEA 4800.

**THEA 4870\* Stage Lighting I 3** (2) Theory and practice of stage lighting through an understanding of various lighting instruments, lighting control systems, and execution of lighting designs. *Coreq:* THEA 4871.

**THEA 4871\* Stage Lighting I Laboratory 0** (1) Non-credit laboratory to accompany THEA 4870. *Coreq:* THEA 4870.

**THEA 4880 Stage Lighting II 3** (2) Study of advanced stage lighting theories and practices including script analysis, technology, software and execution of lighting designs. Other topics include unions and contracts, shop orders, and assisting the lighting designer. *Preq:* THEA 4870. *Coreq:* THEA 4881.

**THEA 4881 Stage Lighting II Laboratory 0** (3) Non-credit laboratory to accompany THEA 4880. *Coreq:* THEA 4880.

**THEA 4950 Creative Inquiry—Theatre 1-4** (1-4) In consultation with and under the direction of a faculty member, students pursue scholarly activities individually or in teams. These creative inquiry projects may be interdisciplinary. Arrangements with mentors must be established prior to registration. May be repeated for a maximum of eight credits. *Preq:* Consent of instructor.

**THEA 4970\* Scene Painting 3** (2) Practical study of basic painting techniques for the theatre including layout, proper use of materials, painting styles, and texturing techniques. *Coreq:* THEA 4971.

**THEA 4971\* Scene Painting Laboratory 0** (1) Non-credit laboratory to accompany THEA 4970. *Coreq:* THEA 4970.

**THEA 4990\* Independent Studies 1-3** (1-3) Tutorial work for students with special interests outside the scope of existing courses. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

## WILDLIFE AND FISHERIES BIOLOGY

*Professors:* W.H. Conner, J.D. Lanham, P.A. Layton, *Director;* G.K. Yarrow; *Associate Professors:* R.F. Baldwin, W.R. English, P.G. Jodice, A.R. Johnson, E. Mikhailova; *Instructor:* J.R. Davis; *Lecturers:* D. Hagen, S. Rodriguez

**WFB 1010 Introduction to Wildlife and Fisheries Biology 1** (1) Informative sketch of aquaculture, fisheries science, and wildlife management. Introduces principles, resources, professional organizations, and careers in these fields. Offered fall semester only. *Preq:* Wildlife and Fisheries Biology field of study.

**WFB 1020 Methods of Wildlife and Fisheries Biology 1** (2) Introduction to methodology used in aquaculture, fisheries science, and wildlife management. Students are introduced to terminology, techniques, laws, and legislations. Skills with dimensions, units, computations, and technical communications as applied to aquaculture, fisheries, and wildlife. *Preq:* Wildlife and Fisheries Biology field of study. *Preq or concurrent enrollment:* WFB 1010.

**WFB 3000 Wildlife Biology 3** (3) Natural history, biology, and conservation of wildlife managed by natural resource agencies. Attention is given to those factors important in the management and conservation including species distribution and abundance, habitat requirements, and life-history characteristics. Principles and problems associated with conservation of selected wildlife species are covered. *Preq:* One of the following combinations: BIOL 1030 and BIOL 1050 and BIOL 1040 and BIOL 1060; OR BIOL 1100 and BIOL 1110.

**WFB 3010 Wildlife Biology Laboratory 1** (3) Identification of wildlife species with emphasis on game and non-game wildlife species managed or protected by state and federal agencies. One or more required weekend field trips will be scheduled. *Preq:* Wildlife and Fisheries Biology field of study. *Preq or concurrent enrollment:* WFB 3000.

**WFB 3060 Introduction to Wildlife Conservation 2** (2) Examines the fundamental thinking upon which modern conservation programs have been built.

**WFB 3070 Hunting and Wildlife Management 1** (1) Hunting techniques used to harvest renewable wildlife resources are examined with respect to their roles in sound management practices. The effects of selected hunting regulations on wild populations, safety, and ethics are discussed. *Preq:* Junior standing.

**WFB 3130 Conservation Biology 3** (3) Study of the biological bases for the conservation of flora, fauna, and habitats. Biological factors that influence the decision-making process are also addressed. May also be offered as BIOL 3130. *Preq:* BIOL 1030 and BIOL 1050 and BIOL 1040 and BIOL 1060; OR BIOL 1100 and BIOL 1110.

**WFB 3500 Principles of Fish and Wildlife Biology 3** (3) Introduction to principles of fisheries and wildlife biology on which sound management practices are based. Interrelationships of vertebrate and invertebrate biology, habitat, and population dynamics are covered. *Preq:* One of the following combinations: BIOL 1030 and BIOL 1050 and BIOL 1040 and BIOL 1060; OR BIOL 1100 and BIOL 1110.

**WFB 4100\* Wildlife Management Techniques 3** (1) Covers field and laboratory methods commonly used in wildlife management and research. Students interact with wildlife professionals. Topics include research methodology, estimating wildlife population characteristics, condition measures, and food habits; species determination, sex, and age; capture; population monitoring methods; GIS and mapping techniques, habitat evaluation and improvement. *Preq:* WFB 3000 and WFB 3500. *Coreq:* WFB 4101.

**WFB 4101\* Wildlife Management Techniques Laboratory 0** (6) Non-credit laboratory to accompany WFB 4100. *Coreq:* WFB 4100.

**WFB 4120\* Wildlife Management 3** (2) Basic principles and general practices of wildlife management and conservation are covered. Major problems concerning the management of wildlife resources, with emphasis on upland game species. Laboratory work includes practical work on the Clemson University woodlands and field trips to several areas where wildlife management is being practiced. Includes Honors sections. *Preq:* WFB 3000 and WFB 3500. *Coreq:* WFB 4121.

**WFB 4121\* Wildlife Management Laboratory 0** (3) Non-credit laboratory to accompany WFB 4120. *Coreq:* WFB 4120.

**WFB 4140\* Wildlife Nutritional Ecology 3** (3) Concepts of how terrestrial wildlife obtains and utilizes energy and nutrients in wild ecosystems are taught. Energy and nutrient availability are discussed in the ecological context of distribution, flow, and cycling in natural and modified foraging areas. Physiology of digestion is discussed for major homeotherms. *Preq:* WFB 3000 and 3500.

**WFB 4150\* Quality Deer Management 3** (3) Quality Deer Management (QDM) is a stewardship philosophy that provides desirable hunting experiences by producing white-tailed deer herds with a natural age and sex structure and population size appropriate for habitat conditions. The course will emphasize herd management, habitat management, hunter management and herd monitoring. Online course. *Preq:* Junior standing.

**WFB 4160\* Fishery Biology 3** (2) Principles underlying freshwater fish production. Introduction to major groups of freshwater fishes and their habitats. Topics include identification, age and growth, fecundity, food habits, populations estimation, environmental evaluation, management practices, and fish culture. *Preq:* WFB 3000 and WFB 3500. *Coreq:* WFB 4161.

**WFB 4161\* Fishery Biology Laboratory 0** (3) Non-credit laboratory to accompany WFB 4160. *Coreq:* WFB 4160.

**WFB 4180 Fishery Conservation 3** (3) Survey of conservation efforts directed toward freshwater and marine fisheries resources. Topics include threatened, endangered, and over-exploited species and introductions of exotic species. *Preq:* WFB 3000 and WFB 3500.

**WFB 4300\* Wildlife Conservation Policy 3** (3) Deals with the ecological rationale and management implications of public policy designed for the conservation of American wildlife resources. Emphasis is on managed-land issues. *Preq:* WFB 3000 and WFB 3500.

**WFB 4400 Non-Game Wildlife Management 3** (3) Basic principles and general practices of non-game wildlife management are covered. Emphasis is placed on those principles and practices most appropriately used by state agencies in their management programs for non-game species, along with real-world problems associated with implementation of such programs. *Preq:* WFB 3000 and WFB 3500.

- WFB 4440\* Wildlife Damage Management 3 (2)** Covers the philosophical, sociological, ecological, and economical basis for controlling damage caused by animals problem wildlife populations. Emphasis is placed on fundamentals of prevention and control of damage caused by vertebrate species, especially mammals and birds. Includes interaction with federal and state agencies and private consultants. *Preq:* WFB 3000 and WFB 3500. *Coreq:* WFB 4441.
- WFB 4441\* Wildlife Damage Management Laboratory 0 (3)** Non-credit laboratory to accompany WFB 4440. *Coreq:* WFB 4440.
- WFB 4450 Urban Wildlife Management 3 (3)** Focuses primarily on social, scientific, and ecological aspects of managing wildlife in the urban setting. Basic wildlife management techniques as well as urban planning for wildlife are covered. *Preq:* WFB 3000 and WFB 3500.
- WFB 4500\* Aquaculture 3 (3)** Basic aqua-cultural techniques applied to freshwater and marine organisms; past and present culture of finfishes and shellfishes around the world; principles underlying fish production; water quality, feeding, and nutrition as they influence production of cultured aquatic organisms. *Preq:* WFB 3000 and WFB 3500.
- WFB 4600\* Warmwater Fish Diseases 2 (2)** Study of diseases in warmwater fish including infectious and noninfectious processes. *Preq:* WFB 3000 and WFB 3500.
- WFB 4620\* Wetland Wildlife Biology 3 (3)** Study of wetland wildlife habitats, emphasizing classification by physical, chemical, and biological characteristics; importance of wetland habitat for management and production of wetland wildlife species. Offered fall semester only. Includes Honors sections. *Preq:* WFB 3000 and WFB 3500.
- WFB 4630 Directed Research in Aquaculture, Fisheries, and Wildlife Biology 1 (3)** Research problems in selected areas of aquacultural, fisheries, or wildlife science to introduce students to experimental design, research techniques, and presentation of research results. May be repeated for a maximum of three credits. *Preq:* Junior standing and consent of instructor.
- WFB 4680\* Herpetology 4 (3)** Physiology, functional morphology, ecology, evolution, biomechanics and current literature of amphibians and reptiles. Laboratory study examines morphology and identification of world families and United States genera, as well as southeastern species. Field trips are required. May also be offered as BIOL 4680. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* WFB 4681.
- WFB 4681\* Herpetology Laboratory 0 (3)** Non-credit laboratory to accompany WFB 4680. May also be offered as BIOL 4681. *Coreq:* WFB 4680.
- WFB 4690\* Aquatic Insects 3 (1)** Identification, life history, habitats, and interrelationships of aquatic insects; techniques of qualitative field collecting; important literature and research workers. Includes Honors sections. May also be offered as BIOL 4690 and ENT 4690. *Preq:* ENT 3010. *Coreq:* WFB 4691.
- WFB 4691\* Aquatic Insects Laboratory 0 (6)** Non-credit laboratory to accompany WFB 4690. May also be offered as BIOL 4691 or ENT 4691. *Coreq:* WFB 4690.
- WFB 4750\* Economics of Wildlife Management and Policy 3 (3)** Integrated approach to the study of the economics of wildlife. Topics include determination of market and nonmarket value, single and multiple species management, enterprise cost and returns, marketing wildlife, leasing methods, complementarity and competitiveness with agricultural and forestry enterprises, and timber and crop damage cost estimates and control. May also be offered as APEC 4750. *Preq:* APEC 2020 or ECON 2000 or ECON 2110 or FOR 3040 or WFB 3060.
- WFB 4760\* Bird Conservation and Ecology 3 (1)** Field-intensive introduction to the identification, ecology, and conservation of North American birds and their habitats with an emphasis on management and applied field ornithology. Includes bird/habitat survey and census techniques. At least one weekend (Friday-Sunday) field trip is required. *Preq:* BIOL 1040 and BIOL 1060; or BIOL 1110. *Coreq:* WFB 4761.
- WFB 4761\* Bird Conservation and Ecology Laboratory 0 (4)** Non-credit laboratory to accompany WFB 4760. *Coreq:* WFB 4760.
- WFB 4930 Selected Topics 1-4 (1-4)** Specialized topics which explore current areas of research and management in aquaculture, fisheries science, or wildlife management are examined in lecture/seminar format. May be repeated for a maximum of ten credits, but only if different topics are covered. *Preq:* Junior standing and consent of instructor. *Coreq:* WFB 4930.
- WFB 4931 Selected Topics Laboratory 0 (1-4)** Non-credit laboratory that may accompany WFB 4930. *Coreq:* WFB 4931.
- WFB 4980 Senior Portfolio 1 (1)** Collection of Web-based materials representing the creative and scientific papers, presentations, and résumés written by students to satisfy curriculum requirements. Students are regularly informed regarding the format and content of their portfolios. *Preq:* Senior standing and Wildlife and Fisheries Biology field of study. *Preq or concurrent enrollment:* FNR 4990.

## WOMEN'S STUDIES

*Professor:* J.M. Melton; *Associate Professor:* E.K. Sparks;  
*Assistant Professor:* M. Shockley; *Lecturer:* S. Watts

**WS 1030 Women in Global Perspective 3 (3)** Cross-cultural and multidisciplinary introduction to issues facing women globally. Issues may include women and work, violence against women, reproduction and women's health, sexuality and rites of passage, women and the weight of tradition, movements for women's empowerment.

**WS 2300 Women and Leadership 3 (3)** Students learn the basics of leadership, including an understanding of different leadership styles, effective leadership practices, and the unique challenges and opportunities faced by women leaders. Attention is paid to the ways in which female leaders are both the same as and different from their male counterparts, and to the ways in which female leaders can affect positive change in women's lives. Ethical leadership, leadership in a diverse global environment, and different paths to leadership are also explored.

**WS 3010 Introduction to Women's Studies: Women's Lives 3 (3)** Interdisciplinary course exploring the unique features of women's lives from childhood to old age. Content is based on new research in many disciplines, including psychology, sociology, history, literature, and the arts. *Preq:* Sophomore standing.

**WS 3160 Girlhood, Media, and Popular Culture 3 (3)** Explores how the mass media and popular culture contribute to social constructions of girlhood. Employing the critical lens of feminist and communication theories, students examine mediated depictions of girls as well as how girls actively produce and negotiate media and popular culture. May also be offered as COMM 3160. *Preq:* COMM 2010 with a C or better or WS 3010.

**WS 3490 Theories of Gender and Sexuality 3 (3)** Examines the philosophical dimensions of contemporary debates about the relation of sex, gender, and sexuality. May also be offered as PHIL 3490.

**WS 3900 Womens Studies Internship 3 (8)** Faculty-supervised internship provides Women's Studies minors with relevant work experience, mentoring, and networking opportunities with local leaders in business, government, and non-profit organizations. *Preq:* Women's Studies minor, Junior standing, and consent of internship coordinator.

**WS 4010 Senior Seminar 3 (3)** In-depth exploration and analysis of a special topic in the areas of women's and leadership studies, culminating in a senior project documented in written, oral, visual and/or multimedia presentations. Topics vary based on student research interests. *Preq:* Senior standing in Women's Leadership.

**WS 4230\* Women in the Developing World 3 (3)** Comparative anthropological study of women and their status in developing countries around the world. A survey of women's daily lives in a global context, emphasizing education, economics, and the environment. Case studies include microfinance, literacy, reproductive rights and practices, and the impact of religious fundamentalism on women. May also be offered as ANTH 4230. *Preq:* Sophomore standing.

**WS 4360\* Feminist Literary Criticism 3 (3)** Introduces the germinal works of feminist literary theory and criticism. Outlines the development of modern literary criticism by studying feminist versions of the major critical methodologies. May also be offered as ENGL 4360. *Preq:* ENGL 3100.

**WS 4590 Selected Topics in Women's Studies 1-3 (1-3)** Topics change from semester to semester and are announced prior to registration. May be repeated for a maximum of six credits, but only if different topics are covered.

**WS 4900 Creative Inquiry 1-3 (1-3)** Small group work on particular issues with emphasis on involving students in research. Content varies. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

**WS 4950 Independent Study 1-3 (1-3)** Course of study designed by the student in consultation with a faculty member who agrees to provide guidance, discussion, and evaluation of the project. Student must confer with faculty member prior to registration. May be repeated for a maximum of six credits. *Preq:* Consent of instructor.

## YOUTH DEVELOPMENT PROGRAM

**YDP 3000 Youth Development in Society 3 (3)** The course provides an overview of youth development in society. It examines social change and its impact on youth development, the historical development of youth programs, programs and plans designed to be responsive to youth issues, and supports to assist youth in becoming healthy, productive, and engaged citizens. *Preq:* Youth Development Studies major.

**YDP 3050 Theory and Philosophy of Youth Development Work 3 (3)** This course examines the philosophical, conceptual, and theoretical frameworks of positive youth development from the perspective of real-world application within developmental systems. Students explore both the distinctiveness and complementarity between problem-focused and youth development approaches to youth work, and work on building a common language for the field. *Preq:* Youth Development Studies major.

**YDP 3100 Youth Development and the Family 3 (3)** This course focuses on youth in the context of family development and interpersonal family dynamics. Students gain knowledge and skills to strengthen families and foster youth well being. Students also gain the skills to develop effective programs involving the family unit and the ability to conceptualize youth development from a systemic perspective. *Preq:* Youth Development Studies major.

**YDP 3150 Community and Youth Development Systems 3 (3)** This course focuses on organizations and systems that offer opportunities for youth to reach their potential and develop competencies and assets. These approaches include studying educational systems that foster success, community organizations that engage youth in becoming leaders and contributing members, and environments that are conducive to youth well being. *Preq:* Youth Development Studies major.

**YDP 3200 Youth Development in Sport and Physical Activities 3 (3)** This course examines the role of community-based sports in developing healthy youth, specifically the ways in which sport programs can be designed to maximize physical, intellectual, emotional, and social outcomes. Focus is on the role of key adults and institutions in the delivery of youth sport experiences. *Preq:* Youth Development Studies major.

**YDP 3250 Working with Diverse Youth 3 (3)** This course focuses on diversity in youth-oriented programs and settings, and provides an understanding of how race, ethnicity, gender, religion, disability, and social class affect youth development work. An emphasis is placed on building a working knowledge of cultural awareness and sensitivity as applied to the design of youth activities. *Preq:* Youth Development Studies major.

**YDP 3300 Designing Effective Youth Programs 3 (3)** This course introduces students to a variety of approaches to youth development programming. The main focus is on intentional or purposeful program planning designed to achieve targeted youth outcomes. As a class, students design a youth development program that is delivered as a component of YDP 3400. *Preq:* Youth Development Studies major.

**YDP 3350 Youth Activity Facilitation and Leadership 3 (3)** This course provides a foundation for effective activity leadership to meet the needs of diverse youth populations. The course focuses on applying experiential learning approaches; different activity types; choosing activities based on intentionality, specificity, and applicability; activity sequencing; building individual and group efficacy; and activity debriefing and processing. *Preq:* Youth Development Studies major.

**YDP 3400 Delivering Effective Youth Programs 3 (3)** This course provides students with the knowledge and tools to deliver and present effective and intentional youth development programs. The course builds on the content of YDP 3300, and focuses on key programming issues, such as animation plans, equipment and facilities, program flexibility, risk management, and formative and summative assessment. *Preq:* Youth Development Studies major.

**YDP 3450 Creative Activities for Youth 3 (3)** This course examines the use of various creative activities in youth programs. Students explore the cognitive strengths of various creative activities, how to integrate creativity into youth programs, the importance of creative activities in community identity, and the availability of community resources. *Preq:* Youth Development studies major.

**YDP 4400 Youth Program Assessment and Evaluation 3 (3)** Youth development has generated best practice programs as a consequence of evidence-based assessment and evaluation. This course familiarizes students with current best practice programs. Evaluation design concepts and strategies provide a knowledge base that prepares students with the skills to employ in evaluations of youth development programs. *Preq:* Youth Development Studies major.

**YDP 4450 Administration of Youth Development Organizations 3 (3)** This course examines approaches and strategies for the successful administration of youth organizations. Students explore organizational missions, structures, personnel management, legal issues, promotion, financial management, assessment, and strategic planning within the context of public, not-for-profit, and private youth-serving agencies and organizations. *Preq:* Youth Development Studies major.

**YDP 4500 Professional Issues and Ethics in Youth Development 3 (3)** This course provides an intensive study and culminating discussion of contemporary problems, techniques, and ethical issues in youth development. In addition, students are introduced to the process of developing original research questions in the youth development field. *Preq:* Youth Development Studies major.

**YDP 4550 Youth and Technology 3 (3)** This course examines the uses of technology by youth. Students explore the current uses of technology by different types of youth, the ethical issues related to youth and technology, and socio-cultural changes resulting from the use of technology by youth. *Preq:* Youth Development Studies major.

**YDP 4990 Youth Development Fieldwork 3 (2)** This course provides practical experience linking students to new hands-on learning opportunities in youth serving agencies/organizations. Students are required to complete a minimum of 60 hours of experiential learning in a supervised youth services setting. Students develop a professional portfolio and special project as part of this experience. *Preq:* Youth Development Studies major. *Coreq:* YDP 4991.

**YDP 4991 Youth Development Fieldwork Laboratory 0 (4)** Non-credit laboratory to accompany YDP 4990. *Coreq:* YDP 4990.

## FACULTY

- Abdellatif, Ahmed**, *Adjunct Assistant Professor, Bioengineering*. MBBC, 1991, MS, 1997, Alexandria University (Egypt); MS, 2007, PhD, 2007, University of Louisville
- Abercrombie, John G.**, *Senior Lecturer, Biological Sciences*. BS, Furman University, 1995; MS, Clemson University, 2001
- Abernathy, James H., III**, *Adjunct Associate Professor, Industrial Engineering*. BS, University of the South, 1995; MPH, 1996, MD, 2001, University of Alabama-Birmingham
- Abou-Samra, Sulafa**, *Lecturer, Languages*. BA, University of Damascus (Syrian Arab Republic), 1997; MA, University of Texas, 2002
- Abu-Farha, Fadi Kamal**, *Assistant Professor, Automotive Engineering*. BSc, University of Jordan (Jordan), 2001; PhD, University of Kentucky, 2007
- Ackroyd, Patricia C.**, *Adjunct Assistant Professor, Chemistry*. BS, Brigham Young University, 1993; PhD, University of Michigan, 2001
- Adams, Warren P.**, *Professor, Mathematical Sciences*. BS, Lewis University, 1979; MS, 1981, PhD, 1984, Virginia Tech
- Adelberg, Jeffrey W.**, *Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, 1982, MS, 1987, Rutgers University; PhD, Clemson University, 1993
- Adler, Peter H.**, *Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, Washington and Lee University, 1976; MS, 1979, PhD, 1983, Pennsylvania State University
- Agudelo, Paula**, *Associate Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, National University of Colombia (Colombia), 1996; MSc, University of Caldas (Colombia), 2000; PhD, University of Arkansas, 2004
- Ajello, Marco**, *Assistant Professor, Physics & Astronomy*. BSc, 2001, MS, 2001, University of Palermo (Italy); MS, University of Trieste (Italy), 2003; PhD, Technical University Munich (Germany), 2007
- Albright, Dustin Graham**, *Lecturer, School of Architecture*. BS, Washington and Lee University, 2003; MS, 2006, MArch, 2008, Virginia Tech
- Alexander, John C., Jr.**, *Breazeale Professor of Financial Planning, School of Accountancy & Finance*. BBA, 1984, MBA, 1985, Stetson University; PhD, Florida State University, 1991
- Alexis, Frank**, *Assistant Professor, Bioengineering*. BSc, 1999, MSc, 2000, University of Montpellier II (France); PhD, Nanyang Technological University (Singapore), 2006
- Alexov, Emil Georgiev**, *Professor, Physics & Astronomy*. MS, 1984, PhD, 1990, Sofia University (Bulgaria)
- Allard, Cora M.**, *Lecturer, Biological Sciences*. BS, Millikin University, 2000; MS, University of Kentucky, 2003
- Allen, Jeffery S.**, *Adjunct Assistant Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, Michigan State University, 1983; MS, University of South Carolina, 1986; PhD, Clemson University, 2005
- Allen, Lawrence R.**, *Dean, College of Health, Education & Human Development; Professor, Parks, Recreation, & Tourism Management*. BS, West Chester State University, 1970; MS, 1974, PhD, 1979, University of Maryland
- Alley, Pamela R.**, *Senior Lecturer, Psychology*. BA, 1975, MA, 1978, PhD, 1983, University of Connecticut
- Alley, Thomas R.**, *Professor, Psychology*. BA, 1975, BS, 1975, Pennsylvania State University; MA, 1979, PhD, 1981, University of Connecticut
- Allison, David J.**, *Alumni Professor, School of Architecture*. BS, 1978, MArch, 1982, Clemson University; FAIA
- Allred, Sherri Terese**, *Lecturer, English*. BA, University of North Carolina-Charlotte, 1991; MA, Clemson University, 2007
- Altstatt, Hamilton S.**, *Assistant Professor, Performing Arts*. BS, Drexel University, 1983
- Alyanak, Edward J.**, *Adjunct Assistant Professor, Mechanical Engineering*. BS, Purdue University, 2002; PhD, Wright State University, 2006
- Amerson, Roxanne**, *Assistant Professor, School of Nursing*. BS, Regents College, 1995; MSN, Clarkson College, 1999; PhD, Clemson University, 2009
- An, Yanming**, *Professor, Languages*. BA, 1982, MA, 1985, Fudan University (China); PhD, University of Michigan, 1997
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- Antcil, Annick**, *Assistant Professor, Environmental Engineering & Earth Sciences*. BME, École Polytechnique de Montréal (Canada), 2005; MS, 2007, PhD, 2011, Rochester Institute of Technology
- Andersen, Charles B.**, *Adjunct Professor, Environmental Engineering & Earth Sciences*. BS, Texas A&M University, 1984; MS, Miami University, 1988; PhD, Syracuse University, 1994
- Anderson, David P.**, *Adjunct Professor, Chemical & Biomolecular Engineering*. BA, Clemson University, 1973; MS, 1977, PhD, 1981, University of Massachusetts
- Anderson, Denise Marie**, *Associate Professor, Parks, Recreation & Tourism Management*. BA, Illinois Wesleyan University, 1992; MS, Eastern Illinois University, 1993; PhD, University of Illinois, 2000
- Anderson, Henry K.**, *Lecturer, School of Accountancy & Finance*. BA, Furman University, 1979; MPAcc, Clemson University, 1984; CPA (Georgia and South Carolina), CMA
- Anderson, Paul Christopher**, *Associate Professor, History*. BA, University of North Carolina, 1990; MA, 1994, PhD, 1998, University of Mississippi
- Andrae, John G.**, *Associate Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, Texas A&M University, 1993; MS, Oklahoma State University, 1995; PhD, University of Idaho, 2000
- Andrew, John R., Jr.**, *Professor, History*. BA, University of North Carolina, 1987; MA, Clemson University, 1993; PhD, University of Georgia, 1997
- Andrews, Phillip Alexander**, *Assistant Professor, Military Leadership; Major, U.S. Army*. BA, University of South Carolina, 1999
- Andrus, Ronald D.**, *Professor, Civil Engineering*. BS, 1983, MS, 1986, Brigham Young University; PhD, University of Texas, 1994
- Anido, Raquel**, *Assistant Professor, Languages*. Licenciatura en Derecho, University of Barcelona (Spain), 2003; PhD, Johns Hopkins University, 2010
- Anker, Jeffrey Nathan**, *Assistant Professor, Chemistry*. BS, Yale University, 1998; PhD, University of Michigan, 2005
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- Apon, Amy W.**, *Division Chair and Professor of Computer Science, School of Computing*. BS, 1979, MA, 1981, MS, 1983, University of Missouri-Columbia; PhD, Vanderbilt University, 1994
- Appling, Jeffrey R.**, *Associate Dean for Curriculum, Undergraduate Studies; Associate Professor, Chemistry*. BS, 1980, PhD, 1985, Georgia Institute of Technology
- Arab, Ali**, *Adjunct Assistant Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, Iran University of Science and Technology (Iran), 1999; MS, Southern Illinois University-Edwardsville, 2002; PhD, University of Missouri-Columbia, 2007
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- Arthur-Banning, Skye Gerald**, *Associate Professor, Parks, Recreation & Tourism Management*. BS, Brock University (Canada), 1997; MS, Oregon State University, 1999; PhD, University of Utah, 2005
- Arya, Dev Priya**, *Professor, Chemistry*. BS, University of Delhi (India), 1996; PhD, Northeastern University, 1996
- Ash, Erin Michelle**, *Assistant Professor, Communication Studies*. BA, College of Charleston, 2008; MA, 2010, PhD, 2013, Pennsylvania State University
- Ashley-Ross, Miriam Adele**, *Adjunct Associate Professor, Biological Sciences*. BS, Northern Arizona University, 1988; PhD, University of California-Irvine, 1994
- Ashton, Susanna M.**, *Professor, English*. BA, Vassar College, 1989; MA, 1993, PhD, 1998, University of Iowa
- Askew, George R.**, *Associate Director, Clemson University Public Service Activities Research and Education Centers*. BS, 1976, MS, 1978, PhD, 1981, Clemson University
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- Axelrod, Ysaaca D.**, *Assistant Professor, Teacher Education*. BA, Haverford College, 1999; MA, University of California, 2003; EdD, Teachers College, Columbia University, 2012
- Ayalew, Beshah**, *Associate Professor, Automotive Engineering*. BS, Addis Ababa University (Ethiopia), 1997; MS, 2000, PhD, 2005, Pennsylvania State University
- Ayaz-Maierhafer, Birsan**, *Adjunct Assistant Professor, Environmental Engineering & Earth Sciences*. BS, 1986, MS, 1990, PhD, 1998, Istanbul Technical University (Turkey)
- Aziz, Nadim M.**, *Associate Provost, Provost & Vice President for Academic Affairs*. BSCE, 1978, MS, 1980, PhD, 1984, University of Mississippi
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- Baeza Migueles, Juan Antonio**, *Assistant Professor, Biological Sciences*. Licenciatura, 1995, Master, 1999, Catholic University of the North (Chile); PhD, University of Louisiana at Lafayette, 2006
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- Bailey, Beatrice Naff**, *Professor, Teacher Education*. BA, Longwood College, 1978; MA, Bethany Theological Seminary, 1981; EdD, Virginia Tech, 1987
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- Baldwin, Robert Fritz**, *Associate Professor, School of Agricultural, Forest, & Environmental Sciences*. BA, Colby College, 1985; MS, George Mason University, 1992; PhD, University of Maine, 2005
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- Ballato, John M.**, *Vice President, VP Economic Development & PSA*. BS, 1993, MS, 1995, PhD, 1997, Rutgers University
- Bandara, Damitha**, *Visiting Assistant Professor, Mathematical Sciences*. BS, 2002, Post graduate diploma, 2007, University of Peradeniya (Sri Lanka); Postgraduate Diploma, University of Sri Jayewardenepura (Sri Lanka), 2006; MS, 2010, PhD, 2012, Clemson University
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- Barth, Jeremy L.**, *Adjunct Assistant Professor, Bioengineering*. BS, Clemson University, 1987; PhD, University of Georgia, 1996
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- Beacham, Jeffery L.**, *Adjunct Assistant Professor, Biological Sciences*. BS, 1979, MS, 1983, Clemson University; PhD, State University of New York-Albany, 1988
- Beasley, Donald E.**, *Professor, Mechanical Engineering*. BS, 1978, MS, 1980, Clemson University; PhD, University of Michigan, 1983
- Beasley, Virginia Leigh**, *Adjunct Associate Professor, School of Nursing*. BS, Emory University, 1980; MD, Medical College of Georgia, 1984
- Beckett, Joyce A.**, *Lecturer, Teacher Education*. BA, Rowan University, 1966; MA, College of New Jersey, 1972; PhD, Clemson University, 1996
- Bednar, Edward J.**, *Adjunct Assistant Professor, Bioengineering*. BA, 1978, MD, 1982, Wayne State University
- Beecher, Lance Edward**, *Lecturer, School of Agricultural, Forest, & Environmental Sciences*. BS, 1993, MS, 1996, Louisiana State University; PhD, Clemson University, 2013
- Beeson, Craig C.**, *Adjunct Associate Professor, Bioengineering*. BS, California State University-Northridge, 1982; MS, San Diego State University, 1985; PhD, University of California-Irvine, 1993
- Bein, Amit**, *Associate Professor, History*. BA, 1996, MA, 2000, Tel Aviv University (Israel); PhD, Princeton University, 2006
- Bell, Phillip D.**, *Adjunct Professor, Bioengineering*. BS, Millsaps College, 1974; PhD, University of Alabama-Birmingham, 1980
- Bell, Zane W.**, *Adjunct Professor, Environmental Engineering & Earth Sciences*. BS, 1973, MS, 1973, Rensselaer Polytechnic Institute; PhD, University of Illinois, 1979; MS, University of Tennessee, 1986
- Bellinger, Robert G.**, *Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, 1974, MS, 1979, University of Maryland; PhD, Virginia Tech, 1985
- Belotti, Pietro Luigi**, *Adjunct Assistant Professor, Mathematical Sciences*. MSc, 1999, PhD, 2003, Politecnico di Milano University (Italy)
- Benedict, Robert Creighton**, *Assistant Professor, Planning, Development, & Preservation*. BA, University of North Carolina-Charlotte, 1975; MBA, University of Georgia, 1976; MA, Goucher College, 1997; PhD, Clemson University, 2009
- Bennett, Delancy H.S.**, *Lecturer, Marketing*. BA, 1993, MBA, Wake Forest University, 2000; PhD, University of Massachusetts-Amherst, 2013
- Benson, Christopher A.**, *Lecturer, English*. BA, 1987, MA, 1990, Clemson University
- Benson, Delwin E.**, *Adjunct Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, 1971, MS, 1973, PhD, 1989, Colorado State University
- Benson, Eric P.**, *Professor, School of Agricultural, Forest, & Environmental Sciences*. BS, University of Vermont, 1979; MS, Fairleigh Dickinson University, 1984; PhD, Clemson University, 1988
- Benson, Lisa C.**, *Associate Professor, Engineering & Science Education*. BS, University of Vermont, 1982; MS, 1986, PhD, 2002, Clemson University
- Benson, Sally M.**, *Adjunct Professor, Environmental Engineering & Earth Sciences*. BA, Columbia University, 1977; MS, 1984, PhD, University of California, 1988
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- Lewis, Gordon, PhD, Professor Emeritus of Ceramic and Materials Engineering
- Lewis, Stephen A., PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Ligon, James Teddie, PhD, Professor Emeritus of Agricultural and Biological Engineering
- Lindsay, Cotton M., PhD, Professor Emeritus of Economics
- Linville, Dale Edward, PhD, Professor Emeritus of Agriculture and Bioengineering
- Locke, Ernest Lyle, County Extension Agent Emeritus
- Logan, Barbara N., Professor Emerita of Nursing
- Louderback, Joseph Girard, PhD, Professor Emeritus of Accounting
- Lovedahl, Gerald Grey, PhD, Professor Emeritus of Technology and Human Resource Development
- Loyd, Max Ira, PhD, Professor Emeritus of Agricultural and Applied Economics
- Lukawecki, Stanley Michael, PhD, Professor Emeritus of Mathematical Sciences
- Lumpkin, Oliver Reese, PhD, Professor Emeritus of Education
- Lupo, Barbara H., MS, County Extension Agent Emerita
- Macy, Jacques Berr, MAT, Professor Emeritus of French
- Madison, Alan Wayne, PhD, Associate Professor Emeritus of School of Computing
- Maloney, Michael T., PhD, Professor Emeritus of Economics
- Manley, Donald G., Professor Emeritus of Entomology
- Manson, Joseph R., PhD, Professor Emeritus of Physics and Astronomy
- Marbut, Samuel Alexander, BS, Professor Emeritus of Forestry
- Marsinko, Allan, Professor Emeritus of Forestry and Natural Resources
- Martin, John Campbell, PhD, Professor Emeritus of Electrical and Computer Engineering
- Martin, Mary Virginia, MA, Extension Associate Emerita
- Martin Jr, Joseph A., BS, County Extension Agent Emeritus
- Martini, Joseph Albert, PhD, Professor Emeritus of Agronomy and Soils
- Mathews, Andrew Clark, PhD, Professor Emeritus of Botany
- Mathis, Lee Terrell, Jr., Distinguished County Agent Emeritus
- Matthews, James Edward, EdD, Dean Emeritus, College of Education; Professor Emeritus of Education
- Matthewson, Charles, PhD, Chair and Professor Emeritus of Construction Science and Management
- Maurer, Donald Edwin, EdD, Professor Emeritus of Industrial Education
- Maurice, Denzil V., Ph.D., Professor Emeritus of Animal and Veterinary Sciences
- Mazur, Anthony Robert, PhD, Professor Emeritus of Crop and Soil Environmental Science
- McCullough, Joe Lawrence, PhD, Professor Emeritus of Philosophy
- McConnell, James Calvin, Jr., PhD, Professor Emeritus of Animal and Veterinary Sciences
- McCormac, Jack Clark, LLD, Alumni Professor Emeritus of Civil Engineering
- McCormick, Robert M., PhD, Professor Emeritus of Economics
- McCutcheon, Gloria S., PhD, Professor Emerita of Entomology, Soils, and Plant Sciences
- McDaniel, Martha Huggins, Area County Extension Agent Emerita
- McDowell, Helen Camp, BA, County Extension Agent Emerita
- McElreath, Robert B., PhD, Professor Emeritus of Finance
- McGregor, Rob Roy, Jr., PhD, Professor Emeritus of French and Latin
- McGregor, William Henry Davis, PhD, Dean Emeritus, College of Forest and Recreation Resources; Professor Emeritus of Forestry
- McGuire, Francis A., PhD, Alumni Distinguished Professor Emeritus of Parks, Recreation, and Tourism Management
- McInnis, Thomas McLeod, Jr., PhD, Professor Emeritus of Biological Sciences
- McKale, Donald M., PhD, Class of 1941 Memorial and Professor Emeritus of History
- McLaughlin, John Joseph, PhD, Professor Emeritus of English
- McLean, Edward Lee, PhD, Professor Emeritus of Agricultural and Applied Economics
- McLellan, Margaret K., PhD, Associate Professor Emerita of Parks, Recreation, and Tourism Management
- McLellan, Robert Wesley, PhD, Chair and Professor Emeritus of Parks, Recreation, and Tourism Management
- McNatt, Jo Ann, PhD, Professor Emerita of French
- McNulty, Peter J., PhD, Professor Emeritus of Physics and Astronomy
- Melshimer, Stephen S., PhD, Professor Emeritus of Chemical Engineering
- Melton, Judith M., PhD, Associate Dean and Professor Emerita of Languages
- Melton, Tony, BS, County Extension Agent Emeritus
- Menke, Warren Wells, PhD, Professor Emeritus of Management
- Miller, Ansel Eldon, PhD, Professor Emeritus of Forest Resources
- Miller, Donald Piguet, PhD, Professor Emeritus of Physics
- Miller, James A., PhD, Associate Professor Emeritus of History
- Miller, James Cleo, Jr., PhD, State Extension Leader Emeritus
- Miller, Robert Walker, Jr., PhD, Professor Emeritus of Plant Pathology and Physiology
- Miller, Stephen E., Professor Emeritus of Applied Economics and Statistics
- Miller, Yvonne Holliday, MS, Staff Development Specialist Emerita
- Mixon, Robert Floyd, MA, Professor Emeritus of Spanish
- Molz, Fred J., III, Distinguished Scientist and Professor Emeritus, Environmental Engineering and Earth Sciences
- Montanucci, Richard R., PhD, Associate Professor Emeritus of Biological Sciences
- Moran, Ronald Wesson, PhD, Associate Dean Emeritus, College of Architecture, Arts, and Humanities; Professor Emeritus of English
- Morr, Charles Vernon, PhD, Stender Professor Emeritus of Food Science
- Morris, Michael A., PhD, Professor Emeritus of Political Science
- Morse, John C., PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Moss, William F., PhD, Alumni Distinguished Professor Emeritus of Mathematical Sciences
- Moyle, David D., PhD, Associate Professor Emeritus of Bioengineering and Physics
- Mullins, Joseph Chester, PhD, Professor Emeritus of Chemical Engineering
- Munson, Priscilla G., MLS, Librarian Emeritus
- Murdoch, Janice W., PhD, Professor Emerita of Psychology and Vice Provost and Dean of Undergraduate Studies
- Murrow, Elizabeth Jean, PhD, Professor Emerita of Nursing
- Nance, John William, BAg, County Extension Agent Emeritus
- Newton, Alfred Franklin, EdD, Head and Professor Emeritus of Industrial Education
- Nicholas, David M., Jr., PhD, Kathryn and Calhoun Lemon Professor Emeritus of History
- Nix, Larry Edward, Professor Emeritus of Forestry and Natural Resources
- Noblet, Gayle P., PhD, Professor Emerita of Biological Sciences
- Nocks, Barry C., Ph.D., Professor Emeritus of Planning, Development, and Preservation Landscape Architecture
- Nowack, Robert F., LLD, Alumni Professor Emeritus of Civil Engineering
- Nunnery, Henry Grady, III, MAg, County Extension Agent Emeritus
- Nyankori, James C. O., PhD, Professor Emeritus of Agriculture Economics
- Odom, Stephen, Jr., MS, County Extension Director Emeritus
- Ogle, Wayne Leroy, PhD, Professor Emeritus of Horticulture
- Oglesby, Frances Madelynn, PhD, Professor Emerita of Nursing
- Okafor, Chinyelu B., Assistant Professor Emeritus, Public Health Sciences
- Olson, Larry W., Ph.D., Associate Professor Emeritus of Animal and Veterinary Sciences
- Owens, Emma M., PhD, Professor Emeritus of Curriculum and Instruction
- Owens, Rameth Richard, PhD, Professor Emerita of History
- Owens, Walton Harrison, Jr., PhD, Professor Emeritus of Political Science
- Owings, Marvin Alpheus, PhD, Head and Professor Emeritus of English
- Oxendine, Laval, MS, County Extension Agent Emeritus
- Oxner, John W., MS, County Extension Agent Emeritus
- Padgett, Adrian Lewis, MS, Professor Emeritus of Agricultural Economics and Rural Sociology, Pee Dee Research and Education Center
- Padilla, Michael J., PhD, Professor Emeritus of Teacher Education
- Page, Edward W., III, PhD, Professor Emeritus of Computer Science
- Palmer, James Howell, PhD, Professor Emeritus of Agronomy and Soils
- Pardue, Fred Eugene, PhD, Professor Emeritus of Animal, Dairy, and Veterinary Sciences
- Pardue, John Cecile, Jr., BS, Area County Extension Agent Emeritus
- Park, Lauretta Irene, PhD, Professor Emerita of Psychology
- Parker, David Andrew, MS, County Extension Agent Emeritus
- Parks, Clyde Leonard, PhD, Professor Emeritus of Agronomy and Soils
- Parks, Thomas Ilon, PhD, Professor Emeritus of Educational Leadership
- Pate, Dove Henry, Jr., EdD, Professor Emeritus of Technology and Human Resource Development
- Pearson, L. Wilson, PhD, Professor Emeritus of Electrical and Computer Engineering
- Peck, John Charles, PhD, Professor Emeritus of Computer Science
- Pennscott, William Walter, EdD, Professor Emeritus of Education
- Peppers, Larry G., PhD, Professor Emeritus of Sociology
- Perry, Philip Rodney, MAg, County Extension Agent Emeritus
- Pertuit, Alton Joseph, Jr., PhD, Professor Emeritus of Horticulture
- Peters, Chris L., PhD, Associate Professor Emeritus of Teacher Education
- Pinkerton, Bruce W., PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Pipkins, Toni Scott, BS, Extension Associate Emerita
- Pivorun, Edward B., PhD, Professor Emeritus of Biological Sciences
- Placone, Dennis L., PhD, Professor Emeritus of Economics
- Platts, Rebecca Gaines, BA, County Extension Director Emerita
- Polk, George Merritt, Jr., MArch, Professor Emeritus of Architecture
- Porter, Nancy M., PhD, Professor Emerita of Family Outreach
- Potts, Thomas D., PhD, Professor Emeritus of Parks, Recreation, and Tourism Management
- Powell, Gary L., PhD, Professor Emeritus of Genetics and Biochemistry
- Price, Dawn Louisa, BS, County Extension Agent Emerita

- Privette, Charles Victor, Jr., MS, Professor Emeritus of Agricultural and Biological Engineering
- Proctor, Thomas Gilmer, PhD, Professor Emeritus of Mathematical Sciences
- Quisenberry, Virgil L., Ph.D., Professor Emeritus of Agronomy and Soils
- Rajapakse, Nihal C., Ph.D., Professor Emeritus of Environmental Horticulture
- Ransom, Rosa Mitchell, MS, County Extension Agent Emerita
- Rathwell, P. James, PhD, Professor Emeritus of Applied Economics and Statistics
- Ray, John Robert, PhD, Professor Emeritus of Physics and Astronomy
- Reamer, Larry Donald, MS, Professor Emeritus of Forestry
- Reel, Jerome V., Jr., PhD, Senior Vice Provost, University Historian and Professor Emeritus of History
- Reese, Richard M., PhD, Professor Emeritus of Marketing
- Regnier, Ireland Goldsmith, MFA, Professor Emeritus of Visual Arts
- Reneke, James A., PhD, Professor Emeritus of Mathematical Sciences
- Revis-Wagner, Kenyon C., PhD, Professor Emeritus of Biological Sciences
- Rhodes, Billy Beryl, PhD, Professor Emeritus of Horticulture
- Rice, Richard W., PhD, Associate Professor Emeritus of Chemical and Biomolecular Engineering
- Richardson, Eleanor Joyce, MS, Professor Emerita of Family and Youth Development
- Richardson, John Coakley, EdD, Professor Emeritus of Special Education
- Ridley, John Davis, MS, Professor Emeritus of Horticulture
- Rife, Lawrence Albert, MA, Professor Emeritus of Mathematical Sciences
- Riley, Barbara Brunson, County Extension Agent Emerita
- Riley, Helene M., PhD, Alumni Distinguished Professor and Professor Emerita of Languages
- Riley, Melissa B., PhD, Professor Emerita of Entomology, Soils, and Plant Sciences
- Roberts, William Russell, MS, Professor Emeritus of 4-H and Youth Development
- Robinette, David Lamar, PhD, Professor Emeritus of Forest Resources
- Robinson, Lou Johnson, BA, County Extension Agent Emerita
- Robinson, Vernon Lee, PhD, Professor Emeritus of Forest Resources
- Rogers, Clarence D., PhD, Swetenburg Professor Emeritus of School of Materials Science and Engineering
- Rogers, Ernest Brasington, Jr., MS, Professor Emeritus of Agricultural Education
- Rollin, Lucy Waddey, PhD, Professor Emeritus of English
- Rollin, Roger Best, PhD, Lemon Professor Emeritus of Literature
- Rudisill, Carl Sidney, PhD, Professor Emeritus of Mechanical Engineering
- Rudowski, Victor Anthony, PhD, Professor Emeritus of English
- Ruff, William James, BS, County Extension Agent Emeritus
- Ruggles, Janice Camlin, County Extension Agent Emerita
- Ruppert, Edward Ernst, PhD, Professor Emeritus of Biological Sciences
- Russell, C. Bradley, PhD, Professor Emeritus of Mathematical Sciences
- Russell, Linda Latimer, MEd, Extension Regional Director Emerita
- Ryan, Daniel Leo, PhD, Professor Emeritus of Engineering Graphics
- Sabin, Guy Edward, MF, Professor Emeritus of Forest Resources
- Savitsky, George Boris, PhD, Professor Emeritus of Chemistry
- Sawyer, Corinne Holt, PhD, Professor Emerita of English
- Sawyer, Raymond C., PhD, Professor Emeritus of Theatre
- Schindler, James E., PhD, Professor Emeritus of Biological Sciences
- Schneider, Raymond K., MBA, Associate Professor Emeritus of Construction Science & Management
- Schoulties, Calvin L., Ph.D., Emeritus Professor of Entomology, Soils and Plant Sciences
- Schwartz, Arnold Edward, PhD, Dean Emeritus of Graduate School; Professor Emeritus of Civil Engineering
- Schwedler, Thomas E., PhD, Associate Dean and Professor Emeritus of Biological Sciences
- Scott, John Marshall, County Extension Agent Emeritus
- Screen, Arnold, BS, County Extension Agent Emeritus
- Sellers, Harold Calvin, BSIE, Professor Emeritus of Computer Science
- Senn, David James, PhD, Professor Emeritus of Psychology
- Senn, Louie Hampton, Jr., PhD, Director Emeritus of Regulatory and Public Service Programs
- Senn, Taze Leonard, PhD, Head and Professor Emeritus of Horticulture
- Sender, Herman F., PhD, Associate Professor Emeritus of Mathematical Sciences
- Seo, Kenzo, PhD, Professor Emeritus of Mathematical Sciences
- Shelburne, Victor B., PhD, Professor Emeritus of Forestry and Natural Resources
- Shelton, Carole Anne, MS, County Extension Agent Emerita
- Shimel, William Alexander, PhD, State Extension Leader Emeritus
- Shipe, Emerson R., PhD, Professor Emeritus of Agronomy
- Shively, Jessup Maclean, PhD, Professor Emeritus of Biochemistry
- Sias, Frederick Ralph, Jr., PhD, Professor Emeritus of Electrical and Computer Engineering
- Sieverdes, Christopher M., Professor Emeritus of Applied Economics and Statistics
- Sill, Benjamin L., PhD, Professor Emeritus of Civil Engineering
- Sill, Lois P., M.L.S., Librarian Emeritus
- Silvers, Stuart, PhD, Professor Emeritus of Philosophy
- Simmons, James B., EdD, Professor Emeritus of Graphic Communications
- Simms, John Barber, MA, Professor Emeritus of English
- Sinka, Margit, Ph.D., Professor Emerita of German
- Skardon, Beverly Norton, MA, Professor Emeritus of English
- Skelley, George Calvin, Jr., PhD, Professor Emeritus of Animal Science
- Skelton, Billy Ray, PhD, Professor Emeritus of Economics
- Skelton, Bobby Joe, PhD, Vice Provost and Dean Emeritus of Admissions and Registrations; Professor Emeritus of Horticulture
- Skelton, Thomas Eugene, PhD, Head and Professor Emeritus of Entomology
- Skipper, Horace D., PhD, Professor Emeritus of Crop and Soil Environmental Science
- Skove, Malcolm John, PhD, Alumni Professor Emeritus of Physics
- Slann, Martin Wayne, PhD, Chair and Professor Emeritus of Political Science
- Sligh, Chevis Raymond, MS, County Extension Agent Emeritus
- Smart, Patricia A., PhD, Professor Emerita of Nursing
- Smink, Jay, PhD, Professor Emeritus of Leadership, Counselor Education, and Human Organizational Development and Director of the National Dropout Prevention Center
- Smith, Alton Denny, PhD, Associate Professor Emeritus of Biological Sciences
- Smith, Bill Ross, PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Smith, Chester Roland, PhD, Professor Emeritus of Industrial Management
- Smith, Claude, Jr., BS, County Extension Agent Emeritus
- Snell, Absalom West, PhD, Associate Director Emeritus of Agricultural Experiment Station; Professor Emeritus of Agricultural Engineering
- Snelsire, Robert William, PhD, Professor Emeritus of Electrical and Computer Engineering
- Sowell, Talley West, MS, County Extension Agent Emerita
- Spalding, Robert Emmet, Jr., MS, Extension Associate Emeritus
- Sparks, Elisa K, PhD, Associate Professor of English
- Sparks, Peter R., PhD, Professor Emeritus of Civil Engineering
- Spitzer, John C., PhD, Professor Emeritus of Animal and Veterinary Sciences
- Spivey, Leslee David, BS, Distinguished County Extension Agent Emerita
- Spragins, John Diggs, PhD, Professor Emeritus of Electrical and Computer Engineering
- Stafford, Georgeanne Hatch, County Extension Agent Emerita
- Stanton, Lynn Arthur, PhD, Professor Emeritus of Agricultural and Applied Economics
- Steadman, Mark Sidney, Jr., PhD, Alumni Distinguished Professor Emeritus of English and Writer in Residence
- Steiner, Pinckney Alston, PhD, Professor Emeritus of Physics
- Steirer, William F., PhD, Associate Professor Emeritus of History
- Stephens, Robert Lorin, MS, County Extension Agent Emeritus
- Stevenson, Dennis E., PhD, Associate Professor Emeritus of School of Computing
- Stevenson, John Lovett, PhD, Assistant Dean Emeritus of Undergraduate Studies; Director Emeritus of Honors Program; Professor Emeritus of Parks, Recreation, and Tourism Management
- Stewart, Harry Eugene, PhD, Professor Emeritus of French
- Stillwell, Ephraim Posey, Jr., PhD, Professor Emeritus of Physics
- Stockham, James Allen, MFA, Professor Emeritus of Art
- Strange, Sylvia Fortner, BS, County Extension Agent Emerita
- Strickland, Deborah Riley, County Extension Agent Emerita
- Stringer, William C., Ph.D., Associate Professor Emeritus of Agronomy and Soils
- Sturgis, Eugenie Ventre, MS, Professor Emerita of Mathematical Sciences
- Sturkie, Douglas Kinly, PhD, Professor Emeritus of Sociology
- Stutzenberger, Fred John, PhD, Professor Emeritus of Biological Sciences
- Sudduth, Terry Q., MS, Assistant Director of Extension Emeritus
- Suggs, Henry Lewis, PhD, Professor Emeritus of History
- Sullivan, Michael Jack, PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Sullivan, Sophia Elizabeth, MS, Librarian Emerita
- Surak, John G., PhD, Professor Emeritus of Applied Economics and Statistics
- Sutton, Russell Wayne, PhD, Professor Emeritus of Applied Economics and Statistics
- Swaja, Richard, PhD, Professor Emeritus of Bioengineering
- Swanson, David Mitchell, PhD, Professor Emeritus of Management and Economics
- Sweeney, James Napoleon, MA, County Extension Director Emeritus
- Sweeney, John R., PhD, Associate Dean and Professor Emeritus of Forestry and Natural Resources
- Swicegood, Myrle Lutterloh, PhD, Assistant Director Emerita of Extension Home Economics; Professor Emerita of Home Economics
- Syme, John Hutton, PhD, Professor Emeritus of Forest Resources
- Szmurlo, Karyna M., PhD, Professor Emerita of Languages
- Tainter, Franklin Hugh, PhD, Professor Emeritus of Forest Resources
- Talbert, Mark J., MS, County Extension Agent Emeritus
- Tanner, Gloria Ann, EdD, Professor Emerita of Nursing Science
- Taras, Michael Andrew, PhD, Head and Professor Emeritus of Forest Resources
- Taylor, Charlotte Murrow, EdD, Professor Emerita of Counseling and Educational Leadership
- Taylor, Mary Lee, Distinguished County Agent Emerita
- Taylor, Theodore D., Associate Professor Emeritus, Materials Science and Engineering
- Tesolowski, Dennis Gregory, EdD, Professor Emeritus of Technology and Human Resource Development
- Testin, Robert Francis, PhD, Chair and Professor Emeritus of Packaging Science; Professor Emeritus of Biosystems Engineering
- Thames, Brenda J., PhD, Associate Dean and Professor Emerita of Family and Youth Development
- Thomas, Frances Petrie, BS, County Extension Agent Emerita
- Thomason, Deborah J., PhD, Professor Emerita of Family and Youth Development
- Thompson, C. Stassen, PhD, Director of Land Management and Professor Emeritus of Applied Economics and Statistics
- Thompson, Carl E., PhD, Professor Emeritus of Animal and Veterinary Sciences
- Thompson, G. Richard, PhD, Professor Emeritus of Economics
- Thompson, Regina, MA, Professor Emerita of Nursing
- Thompson, Sharon W., MSN, Associate Professor Emerita of Nursing
- Thomson, William Russell, MS, Distinguished County Extension Agent Emeritus
- Thurston, Ronald J., PhD, Professor Emeritus of Animal and Veterinary Sciences
- Tillinghast, David Charles, PhD, Professor Emeritus of English
- Timms, Janet L., PhD, Associate Professor Emerita of Nursing
- Titus, Sylvia Smith, MA, Professor Emerita of English



- Titus, Terry Charles**, PhD, Professor Emeritus of Food Science
- Toler, Joe**, PhD, Professor Emeritus of Applied Economics and Statistics
- Trapnell, Jerry Eugene**, PhD, Dean Emeritus, College of Business and Behavioral Science and Professor Emeritus of Accountancy
- Trent, Buford Earl**, MEd, Professor Emeritus of Parks, Recreation, and Tourism Management
- Turk, Donald Earle**, PhD, Professor Emeritus of Food Science
- Turner, Albert Joseph, Jr.**, PhD, Professor Emeritus of Computer Science
- Turner, Raymond Clyde**, PhD, Alumni Distinguished Professor Emeritus of Physics
- Turnipseed, Samuel G.**, PhD, Professor Emeritus of Entomology, Soils, and Plant Sciences
- Tyler, Thomasina Cooper**, Distinguished County Agent Emerita
- Ulbrich, Carlton Wilbur**, PhD, Professor Emeritus of Physics
- Ulbrich, Holley Hewitt**, PhD, Alumni Professor Emerita of Economics
- Underwood, Richard Allan**, PhD, Professor Emeritus of English
- Van Dijk, Howard J.**, PhD, County Extension Agent Emeritus
- Van Lear, David H.**, PhD, Robert A. Bowen Professor Emeritus of Forestry
- Vaughn, Edward A.**, PhD, Professor Emeritus of Materials Science and Engineering
- Vergano, Peter J.**, PhD, Professor Emeritus of Packaging Science
- Vines, Dwight T.**, PhD, Associate Professor Emeritus of Animal and Veterinary Sciences
- Waddle, Gerald Lee**, PhD, Professor Emeritus of Marketing
- Wagner, Donald Finch**, PhD, Professor Emeritus of Horticulture
- Wagner, John R.**, PhD, Professor Emeritus of Environmental Engineering and Earth Sciences
- Wainscott, Stephen H.**, PhD, Professor Emeritus of Political Science and Director of Calhoun Honors College
- Walker, Gerald Lee**, PhD, Professor Emeritus of Art and Architectural History
- Walker, John Henry**, PhD, Professor Emeritus of Educational Foundations
- Walker, Nancy Hilton**, PhD, Professor Emerita of Entomology, Soils, and Plant Sciences
- Walker, Walter Saxon**, MEd, Professor Emeritus of Poultry Science
- Wallace, Myles Stuart**, PhD, Professor Emeritus of Economics
- Wallenius, Kenneth Ted**, PhD, Professor Emeritus of Mathematical Sciences
- Waller, Robert Alfred**, PhD, Dean Emeritus, College of Liberal Arts; Professor Emeritus of History
- Wang, Samuel M.**, MA, Alumni Distinguished Professor Emeritus of Art
- Wannamaker, Patricia Walker**, PhD, Professor Emerita of German
- Ward, Carol Marie**, PhD, Professor Emerita of English
- Ward, William A.**, PhD, Professor Emeritus of Economics
- Warner, John T.**, PhD, Professor Emeritus of Economics
- Warner, Richard D.**, PhD, Professor Emeritus of Environmental Engineering and Earth Sciences
- Watkins, Betty Palmer**, PhD, Professor Emerita of Vocational Education
- Watson, William Anthony**, MS, County Extension Agent Emeritus
- Watt Jr, Marshall P.**, MS, County Extension Agent Emeritus
- Weatherford, Carol G.**, PhD, Associate Professor Emerita of Teacher Education
- Weatherford, David E.**, PhD, Professor Emeritus of Family Outreach
- Webb, Byron Kenneth**, PhD, Dean and Director Emeritus of Cooperative Extension Service; Professor Emeritus of Agricultural and Biological Engineering
- Webb, Carol Johnson**, Associate Dean of Extension Emerita
- Webster, Henry Wise**, PhD, Professor Emeritus of Animal, Dairy, and Veterinary Science
- Weir, Eldon Lee**, EdD, Professor Emeritus of Graphic Communications
- Weir, Julia K.**, MEd, Professor Emerita of Teacher Education
- Wells, Amos, Jr.**, BS, County Extension Agent Emeritus
- Wells, Mae Edwards**, MEd, County Extension Agent Emerita
- Welter, John Finlay**, MS, Professor Emeritus of Poultry Science
- West, William Elmer**, PhD, Chair and Professor Emeritus of Industrial Education and Graphic Communications
- Westall, James M.**, PhD, Professor Emeritus of Computer Science
- Wheeler, Alfred P.**, PhD, Professor Emeritus of Biological Sciences
- Whetstone, Jack M.**, Master's, Associate Professor Emeritus of Forestry and Natural Resources
- White, Charlie R., Jr.**, MS, Associate Professor Emeritus of Parks, Recreation, and Tourism Management
- White, Donald**, BS, County Extension Agent Emeritus
- White, Mervin Forrest**, PhD, Professor Emeritus of Sociology
- White, Richard Kenneth**, PhD, Newman Professor Emeritus of Natural Resources Engineering in Agricultural and Biological Engineering and Environmental Engineering and Science
- White, Sr., Curtis D.**, Ph.D., Professor Emeritus of Biosystems Engineering
- Whitehurst, Clinton Howard, Jr.**, PhD, Professor Emeritus of Management and Economics
- Whitmire, Jerry Morris**, MA, Professor Emeritus of Spanish
- Wiggins, Emily Sutherland**, EdD, Professor Emerita of Home Economics
- Willey, Edward Parker**, PhD, Professor Emeritus of English
- Williams, Frankie K.**, PhD, Associate Professor Emeritus of Leadership, Counselor Education, and Human Organizational Development
- Williams, Gloristine Fowler**, County Extension Agent Emerita
- Williams, John Newton II**, PhD, Professor Emeritus of Animal Science
- Williams, Patricia Miller**, Interim County Extension Director Emerita
- Williams, Thomas M.**, PhD, Professor Emeritus of Forestry and Natural Resources
- Williams, Woodie Prentiss, Jr.**, PhD, Professor Emeritus of Food Science
- Williamson, Robert Elmore**, PhD, Professor Emeritus of Agricultural and Biological Engineering
- Willingham, Russell**, MA, Professor Emeritus of Languages
- Willis, Samuel Marsh**, PhD, Professor Emeritus of Industrial Management
- Wilson, Martha Craft**, County Extension Agent Emerita
- Wilson, Thomas Virgil**, PhD, Alumni Professor Emeritus of Agricultural and Biological Engineering
- Winchell, Donna H.**, PhD, Professor Emerita of English
- Witcher, Wesley**, PhD, Professor Emeritus of Plant Pathology and Physiology
- Witherspoon, Gayland Brooks**, MArch, Associate Dean Emeritus, College of Architecture; Professor Emeritus of Architecture
- Withington, Marian Hull**, MS, Librarian Emerita
- Wixson, Bobby Guinn**, PhD, Dean Emeritus, College of Sciences; Professor Emeritus of Biological Sciences
- Wolak, Francis J.**, PhD, Professor Emeritus of Agricultural and Biological Engineering
- Wood, Gene W.**, Professor Emeritus of Forestry and Natural Resources
- Wood, Wallace Blackwell, Jr.**, Distinguished County Agent Emeritus
- Woodell, Charles Harold**, PhD, Professor Emeritus of English
- Woodruff, James Raymond**, PhD, Professor Emeritus of Agronomy and Soils
- Wooten, Thomas E.**, PhD, Alumni Distinguished Professor Emeritus of Forestry and Natural Resources
- Wynn, Eddie Dowell**, MCRP, Professor Emeritus of Agricultural and Applied Economics
- Wynn, Mable Hill**, MS, Professor Emerita of Parks, Recreation, and Tourism Management
- Xu, Xiao-Bang**, PhD, Professor Emeritus of Electrical and Computer Engineering
- Yandle, Thomas Bruce, Jr.**, PhD, Dean Emeritus, College of Business and Behavioral Science; Alumni Distinguished Professor Emeritus of Economics
- Yang, Tah-Teh**, PhD, Professor Emeritus of Mechanical Engineering
- Yardley, Darrell Gene**, PhD, Professor Emeritus of Zoology
- Yates, William Pierce**, MS, Extension Program Coordinator Emeritus
- Young, Arthur P.**, PhD, Campbell Endowed Chair and Professor Emeritus of English
- Zehr, Eldon Irvin**, PhD, Professor Emeritus of Plant Pathology and Physiology
- Zielinski, Paul Bernard**, PhD, Director Emeritus, Water Resource Research Institute; Professor Emeritus of Civil Engineering
- Zimmerman, James Kenneth**, PhD, Professor Emeritus of Biochemistry

## APPENDIX

### ENGLISH FLUENCY

Clemson University has established a policy to assure that all instructional activities are conducted by individuals possessing appropriate proficiency in written and oral use of the English language. Instructional activities include lectures, recitation or discussion sessions, and laboratories. The individuals to be certified include full-time and part-time faculty, graduate teachers of record, graduate teaching assistants, and graduate laboratory assistants for whom English is not the first language.

A student who experiences difficulty with an instructor's written or oral English and who wishes to seek relief must do so prior to the seventh meeting of a 50-minute class and prior to the fifth meeting of a 90-minute class in regular semesters. In summer sessions, relief must be sought prior to the third class meeting.

The procedure is summarized as follows:

- The student must quickly bring the problem to the attention of the instructor's department chair either directly or through a faculty member such as the student's advisor. That department chair will assess the complaint and, if deemed valid, offer an appropriate remedy within two days.
- A student who is not satisfied with the department chair's decision or the relief suggested, may appeal within two days to a five-member hearing panel comprised of three faculty members and two students appointed by the Senior Vice Provost and Dean of Undergraduate Studies.

Students with questions should contact the Associate Dean of Undergraduate Studies, E-103 Martin Hall.

### EQUAL OPPORTUNITY AFFIRMATIVE ACTION

Clemson University, in compliance with Titles VI and VII of the Civil Rights Act of 1964, as amended, Title IX of the Education Amendments of 1972, and Sections 503 and 504 of the Rehabilitation Act of 1973, does not discriminate on the basis of race, color, national origin, religion, sex, or disability in any of its policies, procedures, or practices; nor does the University, in compliance with the Age Discrimination in Employment Act of 1967, as amended, Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, or Title II of the Genetic Information Nondiscrimination Act of 2008, discriminate against any employees or applicants for employment on the basis of their age, status as a disabled veteran or veteran of the Vietnam era, or their genetic information. Clemson University conducts its programs and activities involving admission, access, treatment, employment, teaching, research, and public service in a nondiscriminatory manner as prescribed by Federal laws and regulations.

In conformance with University policy and pursuant to Executive Order 11246, as amended, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, Clemson University is an Affirmative Action/Equal Opportunity Employer.

Inquiries concerning the above may be addressed to the following:

Director, Office for Access and Equity and Title IX Coordinator  
110 Holtzendorff Hall  
Clemson University  
Clemson, SC 29634

Director, Office for Civil Rights  
Department of Education  
Washington, DC 20201

U.S. Equal Employment Opportunity Commission  
Washington, DC 20507

### FAMILY PRIVACY PROTECTION ACT

The South Carolina Family Privacy Protection Act (SC Code 30-2-10 et. seq.) defines personal information as "...information that identifies or describes an individual including, but not limited to, an individual's photograph or digitized image, social security number, date of birth, driver's identification number, name, home address, home telephone number, medical or disability information, education level, financial status, bank account(s) number(s), account or identification number issued by and/or used by any federal or state governmental agency or private financial institution, employment history, height, weight, race, other physical details, signature, biometric identifiers, and any credit records or reports."

Some of the information in documents which students provide to Clemson University may be personal information as defined above. Pursuant to Section 30-2-40 B, students are advised that this information may be subject to public scrutiny or release. They are also advised that personally-identifiable information contained in these educational records falls under the federal Family Educational Rights and Privacy Act of 1974, as amended (FERPA). If students elect to opt out of the release of directory information under FERPA, the University will not release any personal information except as otherwise required or authorized by law.

Visit <http://www.clemson.edu/privacypolicy.html> for additional information.

### HARASSMENT

In general, harassment is unwelcome verbal or physical contact, based upon race, color, religion, sexual orientation, gender, national origin, age, disability, status as a military veteran, or protected activity (i.e., opposition to prohibited discrimination or participation in the statutory complaint process), that unreasonably interferes with the person's work or educational performance or creates an intimidating or hostile work or educational environment. Examples may include, but are not limited to, epithets, slurs, jokes, or other verbal, graphic, or physical contact.

Title IX of the Educational Amendments of 1972 (amending the Higher Education Act of 1965) is a federal gender equity law that prohibits discrimination based on sex in education programs and activities that receive federal funding. Sexual harassment, which includes sexual violence and other forms of nonconsensual sexual misconduct, is a form of sex discrimination and is prohibited under this law.

The entire text of the University's policy on harassment and additional information on Title IX and sexual harassment can be obtained from the Office of Access and Equity, 110 Holtzendorff, (864) 656-3181 or at [www.clemson.edu/access/policies.html](http://www.clemson.edu/access/policies.html).

### INFORMATION RESOURCES FOR STUDENTS

Clemson University computing resources are the property of Clemson University, to be used for university-related business. Students have no expectation of privacy when utilizing university computing resources, even if the use is for personal purposes. The university reserves the right to inspect, without notice, the contents of computer files regardless of medium, the contents of electronic mailboxes and computer conferencing systems, systems output such as printouts, and to monitor network communication when

1. It is considered reasonably necessary to maintain or protect the integrity, security or functionality of university or other computer resources or to protect the university from liability;
2. There is reasonable cause to believe that the users have violated this policy or otherwise misused computing resources;
3. An account appears to be engaged in unusual or unusually excessive activity;
4. It is otherwise required or permitted by law.

Any suspected violations of this policy or any other misuse of computer resources by students normally should be referred to the Office of Student Conduct. That office will investigate the allegations and take appropriate disciplinary action. Violations of law related to misuse of computing resources may be referred to the appropriate law enforcement agency.

Notwithstanding the above, Clemson Computing and Information Technology may temporarily suspend, block or restrict access to an account, independent of university disciplinary procedures, when it appears reasonably necessary to do so in order to protect the integrity, security or functionality of university or other computer resources, to protect the university from liability, or where the emotional or physical well-being of any person is immediately threatened. When CCIT unilaterally takes such action, it will immediately notify the account holder of its actions and the reason for them in writing. The account holder may appeal the action taken by CCIT in writing to the Chief Information Officer.

Access will be restored to the account holder whenever the appropriate investigatory unit of the university determines that the protection of the integrity, security or functionality of university or other computing resources has been restored and the safety and well being of all individuals can reasonably be assured,

unless access is to remain suspended as a result of formal disciplinary action imposed through the Office of Student Conduct or as a result of legal action.

Use of University computing resources, including network facilities, account numbers, data storage media, printers, plotters, microcomputer systems, and software for computing activities other than those authorized by the University is strictly prohibited. Unauthorized use of such resources is regarded as a criminal act in the nature of theft, and violators are subject to suspension, expulsion, and civil and criminal prosecution.

Use of university computing resources, including network facilities, account numbers, data storage media, printers, plotters, microcomputer systems, and software for computing activities other than those authorized by the university is strictly prohibited. Unauthorized use of such resources is regarded as a criminal act in the nature of theft and violators are subject to suspension, expulsion, and civil and criminal prosecution.

The following are examples of misuse of computing resources:

1. Unauthorized duplication, distribution or alteration of any licensed software. This includes software licensed by the university and licensed software accessed using the computing networks.
2. Attempting to gain unauthorized access to any computing resource or data, or attempting to disrupt the normal operation of any computing resource or network – at Clemson or anywhere on the Internet,
3. Attempting to use another student's or employee's computer account or data, without their permission.
4. Using the university electronic mail system to attack other computer systems, falsify the identity of the source of electronic mail messages. Sending harassing, obscene or other threatening electronic mail. Attempting to read, delete, copy or modify the electronic mail of others without their authorization. Sending, without official university authorization, "for-profit" messages, chain letters or other unsolicited "junk" mail.
5. Knowingly infecting any computing resource with a software virus.
6. Tampering with the university computer network or building wiring or installing any type of electronic equipment or software that could be used to capture or change information intended for someone else.
7. Participating in a "denial of service" attack on any other computer, whether on or off campus.
8. Using university computing or network resources for personal gain or illegal activities such as theft, fraud, copyright infringement, piracy (e.g., sound or video recording), or distribution of child pornography or obscenities.

## PATENTS AND COPYRIGHTS

All students enrolling in Clemson University do so with the full understanding that students working on sponsored projects and/or who use Clemson University resources other than for lecture-based coursework or other course-related assignments are subject to the Clemson University Intellectual Property Policy.

1) In accordance with the University Intellectual Property Policy, student Creators<sup>7</sup> do not hold rights to intellectual property created, developed, or generated:

- i. In the course of rendering compensated services to the University; or
- ii. As part of sponsored research projects; or
- iii. Pursuant to an agreement that requires the University and/or student to assign his or her rights either to the University or to a third party; or
- iv. Using pre-existing or background intellectual property belonging to the University or a third party with whom the University has a contract under which such background intellectual property rights are already allocated.

v. Notes:

1. Student retains a non-exclusive, royalty-free, perpetual, irrevocable license to use, reproduce, and publicly distribute, for educational and/or research purposes, copies of intellectual property created by student.
2. If intellectual property is developed or generated as a group/class project, joint ownership by the collaborators will be assumed unless a prior written agreement exists among the collaborators.

A Creator is defined as an author of, inventor of, or person who discovers, develops, or generates any type of intellectual property. Inventorship and authorship shall be determined in accordance with patent law and copyright law, respectively.

*Section 5.c of the University Intellectual Property Policy, November 23, 2009*

2) All Creators have a duty to promptly disclose intellectual property authored, invented, created, discovered, developed, or generated by Creator(s) to the Clemson University Intellectual Property Committee (IPC). See *Appendix III, University Intellectual Property Policy, November 23, 2009*.

3) Except as set forth in other related University policies, this applies to all types of intellectual property, including, but not limited to, any invention, discovery, creation, know-how, trade secret, technology, scientific or technological development, mask work, trademark, research data, work of authorship, and computer software regardless of whether subject to protection under patent, trademark, copyright, or other laws.

The University Intellectual Property policy is available online at [www.clemson.edu/research/technology/policies](http://www.clemson.edu/research/technology/policies). Questions regarding this policy should be directed to the Office of Technology Transfer at (864) 656-4237.

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