

Carlos Roberto Barrios, *PhD*

School of Architecture
College of Architecture, Arts and Humanities
Clemson University
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EDUCATION

Doctor of Philosophy in Architecture: Design and Computation

Massachusetts Institute of Technology
Department of Architecture
Cambridge | Massachusetts | 2006

Major: Design and Computation

Minors: Computer Science, Artificial Intelligence, Computer Aided Manufacturing, Engineering

Thesis: "*Design Procedures: Computation and Parametric Design of Twisted Tall Buildings*"

Advisor: William Mitchell, Professor of Architecture and Media Arts and Sciences

ABSTRACT: Parametric modeling procedures applied to design and fabrication of complex shape architecture. A case study on twisted tall buildings is presented as the core example where the benefits of twisting towers are discussed. The thesis presents 5 types of parametric models to support all stages of the design process

Master of Architecture

Pratt Institute
School of Architecture.
Brooklyn | New York | 1999

Thesis: "*Transitions: A Morphological Analysis of the recent work of Renzo Piano*"

ABSTRACT: Euclidating Morphogenesis is used as a methodology to study and understand the governing principles of the structural language of Renzo Piano's design in the Jean Marie Tjibaou cultural center in New Caledonia. Piano's original designs are traced to a basic configuration of the simplest possible geometrical arrangement in a morphological step by step process. Each step is recorded as a metamorphosis transformation to uncover the fundamental morphological principles of the original structure. This knowledge is used to create new designs in the language

Architect, B.Arch.

Universidad de los Andes
School of Architecture and Art
Mérida | Venezuela | 1993

Thesis: "*Design Patterns in Caribbean Vernacular Architecture for Sustainable Design*"

ABSTRACT: exploration of patterns in vernacular Caribbean architecture applied to sustainable design. The project included housing development, public spaces and a 24,000 M² market for hot and dry climate. Thesis included extensive use of passive solutions for sustainable climate control.

ADDITIONAL EDUCATION

Diploma of Museum Design

Museum of Fine Arts
Caracas, Venezuela
Special concentration in exhibits spaces, and museum planning and design

Diploma of Engineering

Universidad de los Andes
Merida, Venezuela
Special concentration in structural engineering and seismic resistance structural design

ACADEMIC
POSITIONS

Assistant Professor of Architecture

School of Architecture
College of Architecture, Arts and Humanities
Clemson University
Clemson | South Carolina | 2013-Present

Assistant Professor of Architecture

Architecture Program
School of Visual Arts and Design
College of Arts and Humanities
University of Central Florida
Orlando | Florida | 2011-2013

Chair of Research

School of Architecture and Planning
The Catholic University of America
Washington | District of Columbia | 2008-2010

Assistant Professor of Architecture, Structures and Computation

Master of Architecture & Master of Science in Sustainable Design Programs
School of Architecture and Planning
The Catholic University of America
Washington | District of Columbia | 2006-2011

Assistant | Associate Professor of Architecture

Department of Architectural Composition
School of Architecture | Faculty of Architecture and Art
Universidad de los Andes
Mérida, Venezuela 1995-2007 (On leave 2007-Present)

GRADUATE
THESIS
ADVISING

Transportation, Media and Mass Communication

Elizabeth Turncliff
Master of Architecture Graduate Thesis, The Catholic University of America, 2011
Principal Advisor and Chair of Thesis Committee

Connecting Places

Valerie Berstene
Master of Architecture Graduate Thesis, The Catholic University of America, 2011
Principal Advisor and Chair of Thesis Committee

Hip-Hop Culture and Architecture

Michael Coyle
Master of Architecture Graduate Thesis, The Catholic University of America, 2011
Advisor and Co-Chair of Thesis Committee

Bridging History: A reconstruction of an old railroad bridge

Val Hawkins
Master of Architecture Graduate Thesis, The Catholic University of America, 2011
Committee Member / Reader

High Media: A high-rise development for future communications in Libya

Hussam Elkhrraz
Master of Architecture Graduate Thesis, The Catholic University of America, 2011
Committee Member / Reader

Beyond the Wall: An intervention in Modern day Berlin wall

Lindsey Dehenzel

Master of Architecture Graduate Thesis, The Catholic University of America, 2010
Advisor and Co-Chair of Thesis Committee

Archi-Biotics: Cybernetics, Technology and Design in the City

Audrae Lee

Master of Architecture Graduate Thesis, The Catholic University of America, 2010
Principal Advisor and Chair of Thesis Committee

Light and Shadow as a Space Maker

Christina Lemley

Master of Architecture Graduate Thesis, The Catholic University of America, 2010
Principal Advisor and Chair of Thesis Committee

Parti and Core Mechanic: Game Design strategies for architectural design

Christian Totten

Master of Architecture Graduate Thesis, The Catholic University of America, 2009
Principal Advisor and Chair of Thesis Committee

The Architecture of Taste: Designing a winery as a spatial experience

Christian Rose

Master of Architecture Graduate Thesis, The Catholic University of America, 2010
Advisor and Co-Chair of Thesis Committee

Atonal Composition into Design

Damien Alomar

Master of Architecture Graduate Thesis, The Catholic University of America, 2009
Principal Advisor and Chair of Thesis Committee

PROFESSIONAL EXPERIENCE

Planetary ONE, Brooklyn, NY (2010- present)

Design Partner

Design Partner In charge of design computing, structures and morphology.

Planetary ONE provides innovation through design knowledge networks that transform the speed, scope, and scale of a venture. We foresee strategies for people to shape their natural and cultural surrounds, re-think objects, transports, as well as the streets, parks, open spaces, cultural districts, civic centers, and business hubs that comprise the future metropolis. Ecological design is not only as a philosophy that inspires visions of sustainability but also a focused scientific endeavor

H. Thomas O'Hara Architect, New York, NY (1999-2001)

Project Architect, Project Coordinator

In charge of computing for digital modeling and rendering. Design development and construction documents for several high-rise residential buildings in New York City

Universidad de los Andes, Merida, Venezuela (1995-1999)

Physical Plant Architect

Design architect and project coordinator for physical plant. Projects included the Cardiology Research Center, Law School academic and administrative buildings, Science Museum

CBSF Associates, Merida, Venezuela (1995-2006)

Principal

Private practice for residential and commercial buildings in Venezuela

Planimations Merida Venezuela, (1993-2006)

Principal

Construction Documents, 3D modeling and rendering

Metro de Caracas C.A., Caracas, Venezuela (1991-1993)

Construction Supervisor (intern)

Assisted in daily duties for coordinated construction in first phase of line 3, consisting in 5 underground stations and 6 tunnels. Architect designer for surface reconstruction

**GRANTS AND
AWARDS**

PCI Foundation Research Grant (\$100,000 Grant)

Pre-Cast & Pre-Stressed Concrete Institute

Faculty Research Development Program / Summer Research Grant (\$3,000)

College of Architecture Arts and Humanities
Clemson University

Faculty Research Development Program / Course Release (\$3,000)

College of Architecture Arts and Humanities
Clemson University

Parametric Analysis in the Visual Arts Research Grant (\$7,500)

Office of Research and Commercialization
University of Central Florida

Parametric Forms / Research Grant (\$10,000)

School of Architecture and Planning
The Catholic University of America, January 2010

Fabricating Deployable Structures / Research Grant (\$12,000)

Grant in Aid Program, Office of the Provost
The Catholic University of America, April 2008

Experiments in Digital Architecture / Research Grant (\$25,000)

Grant in Aid Program, Office of the Provost
The Catholic University of America, June 2007

Graduate Student Fellowship, MIT 2005

Special Graduate Students Award, MIT 2003-2004

Thomas Upham Fellowship, MIT 2002-2006

Universidad de los Andes Faculty Fellowship, 1997-1999

Best Thesis: "Design Patterns in Caribbean Architecture for Sustainable Design"

EXHIBITIONS

UCF School of Visual Arts Faculty Show

School of Visual Arts and Design Art Gallery
University of Central Florida
October – November 2012

UCF School of Visual Arts Faculty Show

School of Visual Arts and Design Art Gallery
University of Central Florida October – November 2011

Parametric Sculptures

Recent developments in parametric forms
Inter-American Development Bank Cultural Center
Washington DC May – June 2011

Parametric Winter

Parametric Models of complex shapes on Octahedral symmetry group
Project 4 Gallery
Washington DC April – July 2010

Vertigo

Parametric models of complex forms in the rod symmetry group
Project 4 Gallery
Washington DC September – November 2009

Atonal Musical Composition as a Form Generator

In collaboration with Damien Alomar
Wolk Gallery
Cambridge MA September – December 2008

Digital Design at SIGGRAPH

Computer generated models based on Gaudi's rules for the columns of the Sagrada Familia
Los Angeles Convention Center
Los Angeles CA August 2008

Super Towers

Exhibit of research and student work on complex forms for super tall buildings
Summer Institute of Architecture
Washington DC June – August 2007

Parametrics on Gaudi's Sagrada Familia

Parametric Models of the columns of the Sagrada Familia
The Catholic University of America
October – December 2006

PUBLICATIONS

BOOK (Forthcoming | Under contract with Birkhauser)

Parametric Design in Architecture: Principles, Methods and Applications

Carlos Roberto Barrios, PhD
Birkhauser, Berlin

BOOK CHAPTER

The Computation Nature of Gaudi's Sagrada Familia in Computational Constructs: Architectural Design, Logic and Theory

Carlos Roberto Barrios, PhD
WACA, Shanghai, China, 2009

PAPERS

Discussions on BIM and DIM (in preparation)

Carlos Roberto Barrios, PhD

Expanding Symmetry Notations in Rod-Symmetry groups (in preparation)

Carlos Roberto Barrios, PhD

Parametric Creativity (in preparation)

Carlos Roberto Barrios, PhD

Metamorphosis in Islamic Geometric Patterns (submitted for review)

Carlos Barrios, *PhD* & Mostafa Hashem

The Extraction of New from Traditional (submitted for review)

Mostafa Hashem & Carlos Barrios, *PhD*

Periodic Arrangements of Parametric Gaudinian Columns in Hypercubes
(poster & presentation)

Carlos Roberto Barrios, *PhD*
Design Computing and Cognition (DCC 2014)
London UK, June 2014

Intra-Disciplinary Pedagogy in Design

Carlos Roberto Barrios, PhD, Ufuk Ersoy, PhD, Daniel Harding, Dustin Albright
Association of Collegiate Schools of Architecture International Meeting
Seoul South Korea, June 2014

Navigation and Visualization in Multidimensional Spaces

Carlos Roberto Barrios, *PhD*
Computer Aided Architectural Design and Research in Asia (CADDRIA)
Kyoto Japan, May 2014

Parametric Models in Hyperspace

Carlos Roberto Barrios, *PhD*
102nd ACSA annual meeting. Association of Collegiate Schools of Architecture
Miami Florida, April 2014

**A Textile Block Grammar: Shape Grammars in Frank Lloyd Wright's Californian
Textile Block houses**

Carlos Roberto Barrios, *PhD*
Congreso Internacional de la Sociedad Iberoamericana de Grafica Digital, SIGraDi,
Valparaiso, Chile, November 2013

Parametric Affordances: What? When? How?

Carlos Roberto Barrios, *PhD*
Association for Computer Aided Design in America Regional Conference (ACADIA)
Lincoln, Nebraska, March 2011

Computing with Textile Blocks

Carlos Roberto Barrios, *PhD* and Damien Alomar
Computer Aided Architectural Design and Research in Asia (CADDRIA)
Chiang Mai, Thailand, April 2008

Process as the Link Between Design and Making

Carlos Roberto Barrios, *PhD* and Damien Alomar.
96th ACSA annual meeting. Association of Collegiate Schools of Architecture
Houston Texas, March 2008

Cognitive Models for Parametric Design

Carlos Roberto Barrios, *PhD*

XI Congreso Internacional de la Sociedad Iberoamericana de Grafica Digital, SIGraDi, Universidad La Salle, Mexico, October 2007

Expanding Design Boundaries: *Symmetry Experiments in Frank Lloyd Wright's Textile Block Houses*

Carlos Roberto Barrios, *PhD*

Education and research in Computer Aided Architectural Design in Europe, eCAADe, Technical University of Frankfurt am Main, Frankfurt, Germany, September 2007

Journal Paper

Thinking Parametric Design: Introducing Parametric Gaudi

Carlos Roberto Barrios, *PhD*

Design Studies 27 (2006) pp 309-324

Especial issue on Digital Design and Digital Architecture. Editor: Rivka Oxman. | Elsevier, UK

Evaluation of Parametric Models: *Two provisos for evaluating the column designs of the Expiatory Temple of the Sagrada Familia*

Carlos Roberto Barrios, *PhD*

IX international congress of the Interamerican Society of Digital Graphics, SIGraDi, Universidad Peruana de las Ciencias Aplicadas (UPAC), Lima, Peru, November 2005

Symmetry, Rules and Recursion: *How to design like Santiago Calatrava.*

Carlos Roberto Barrios, *PhD*

Education and research in Computer Aided Architectural Design in Europe, eCAADe Technical University of Lisbon (TU Lisbon), Lisbon, Portugal, September 2005

Counting Parametric Models

Carlos Roberto Barrios, *PhD*

CAAD Futures 2005, Technical University of Vienna (TU Wien)

Vienna, Austria, June 2005

Parametric Gaudi

Carlos Roberto Barrios, *PhD*

VIII International congress of the Interamerican Society of Digital Graphics, SIGraDi Universidad do Rio Grando do Sul (UNISINOS), Sao Leopoldo, Brazil, November 2004

SELECTED RESEARCH

Parametric Analysis in the Visual Arts (2012-2013)

This research project aims investigate the use of parametric models for applications in the visual arts. This project is funded by a grant from the Office of Research and Commercialization of the University of Central Florida.

Virtual Orlando (2011-2013) Collaboration with Dr. K. Thomas McPeck, PhD

This research project aims to produce a database of information on selected historical buildings in the city of Orlando. This project is carried in collaboration with the City of Orlando and the Synthetic Reality research group (SREAL) at the Institute of Simulation and Training (IST)

Parametric Arrangements on Hyper-Structures (2010 - Present)

This research project aims to produce a multi-dimensional matrix of all possible designs produced from a parametric model in Cartesian systems higher than three dimensions. A complete set of the columns of the Sagrada Familia was completed as a prototype of the system in a tessellated Tesseract, a hypercube of 4D. Current work is looking at combining parametric shape grammars with arrangements in 5D and 6D hypercube lattices.

Design Morphology of Kinetic Structures (2000 - Present)

Non-standard deployable structures are generated from a novel methodology applied to angulated scissors mechanism. The methodology allows the creation of regular and irregular deployable frames with designs allowance for complete closed packing and fast deployment.

Textile Parametrics (2002 - Present)

This project looks on the legacy of Frank Lloyd Wright's textile block houses and applies to contemporary digital fabrication processes. The research takes the principle of the single block unit with embedded parametric variables for local adaptability and mass customization. Initial results have identified all the symmetry groups belonging to the textile block designs, and completed a catalog of all possible designs using the original Frank Lloyd Wright rules. A Visual Basic computer application was written to generate the original textile blocks and new designs in the language

Outside the Box: Complex Geometry in Skyscrapers (2004 - Present)

This ongoing research explores new developments in the formalistic and structural forms for high-rise buildings. It also explores how computational and digital fabrication technologies continue to challenge the steel and glass extruded box paradigm of modern skyscrapers and other historical types. This research also explores the ecological benefits of complex forms in high-rise buildings

Symmetry Descriptions for Non-Regular Shapes (ongoing)

This current research project explores a series of experiments in looking for a unified theory to provide accurate symmetry descriptions of non-regular 3D shapes. Symmetry groups are the product of operations that identify regular patterns in shapes. This research aims to present a unified class for the description of complex shapes. This project has resulted in two exhibits and was funded by the Catholic University of America Grant in Aid program

Gothic Rebuilt (2006 - Present)

This pilot project focused on digital reconstruction of medieval cathedrals and production of 3D models in rapid prototyping devices. The goal is to have a live archive of historical buildings to be used for research and teaching aids. In particular the research aims to take a closer look to the advances of structural systems in medieval structures. Specific attention is given to the development of the structural components that resulted in higher and lighter buildings. This pilot project was funded by the Grant in Aid program

Parametric Gaudi (2002 - Present)

This research established a methodology for digital geometric modeling of complex forms: *Design Procedures*. Successfully completed parametric models of the columns of the Sagrada Familia temple demonstrating the usefulness of parametric models in design. Generated more than 400 new column designs in less than 4 days. Using a 3D printing device fabricated 92 rapid prototype models of the column designs in less than 2 weeks. This work done with the assistance of Professor Mark Burry from the Royal Melbourne Institute of Technology in Australia. Parametric models for the vaults are currently being developed.

Thin-Shell Structure Grammars (2004 - Present)

Designed and wrote a computer application in AutoLISP that generates frame structures from ruling lines of curved surfaces. The application successfully created systematic compositions and random arrangements of tessellated triangular shapes. The program generated STL output files for 3D printing devices in seconds. Generated a total of 86 designs from the parametric models and completed 32 rapid prototypes in ZCorp printing machine in a matter of days

Digital Design Fabrication (2002 - 2006)

In collaboration with Professor Larry Sass, MIT

Developed and completed a set of seven exercises for teaching digital fabrication and rapid prototyping in graduate level courses at MIT's Department of Architecture. The exercises have been successfully used in undergraduate and graduate courses pertaining digital design, rapid prototyping and digital driven fabrication. One of the courses is now a required class in the computation stream for both undergraduate and graduate programs at MIT

Fabricating Surfaces (2002 - 2004)

In collaboration with Professor Larry Sass, MIT

Designed a double curved glass curtain wall system and joint details. Build parametric computational models for rapid prototyping in Fuse Depositional Model machines (FDM) of the curved glass molds and joint fittings. Constructed more than 22 models at different scales using a variety of rapid prototyping devices to test the components of the curtain wall system. Build quarter size mockup of the curved wall with all assembly components.

Shape Grammar on Santiago Calatrava (2000 - 2004)

In collaboration with Professor Terry Knight, MIT

Developed a shape grammar of the work of Spanish Architect Santiago Calatrava. The shape grammar reconstructed 32 of the most significant buildings designed by the architect before 2001, and generated more than 900 new possible designs in the language

Morphogenesis on Renzo Piano (1998 - 2000)

Work on morphological analysis of the structures of Renzo Piano. Made scale and computer models and analyzed selected Piano's designs. Project done under the supervision of Professor Haresh Lalvani, Pratt Institute

PRESENTATIONS

Navigation and Visualization in Multidimensional Spaces

Carlos Roberto Barrios, PhD
Computer Aided Architectural Design and Research in Asia (CADDRIA)
Kyoto Japan, May 2014

Parametric Models in Hyperspace

Carlos Roberto Barrios, PhD
102nd ACSA annual meeting. Association of Collegiate Schools of Architecture
Miami Florida, April 2014

A Textile Block Grammar: Shape Grammars in Frank Lloyd Wright's Californian Textile Block houses

Carlos Roberto Barrios, PhD
Congreso Internacional de la Sociedad Iberoamericana de Grafica Digital, SIGraDi,
Valparaiso, Chile, November 2013

Design Topology (Key Note)

Carlos Roberto Barrios, PhD
Trans-Element Symposium Washington DC 2012

Design Morphology (non-peer reviewed)

Synthetic Reality Lab (SREAL)
Institute for Simulation and Training (IST)
University of Central Florida

Parametric Affordances: What? When? How?

Carlos Roberto Barrios, PhD
Association for Computer Aided Design in America Regional Conference (ACADIA)
Lincoln, Nebraska, March 2011

Recent work on Parametric Design

MIT 2nd Design and Computation Symposium
Cambridge, MA, February 2010

Design is Parametric

MIT 1st Design and Computation Symposium
Cambridge, MA, February 2009

Thinking Parametric Design (invited)

American Institute of Architects in New York
New York, NY, November 2008

Parametric Modeling & Parametric Design (invited)

Summer Institute of Architecture
School of Architecture and Planning. The Catholic University of America
Washington DC, June 2008

Process as the Link Between Design and Making

Association of Collegiate Schools of Architecture Annual Meeting
Houston, Texas, March 2008

Structural Poetry (invited)

Comprehensive Building Design Studio
School of Architecture and Planning. The Catholic University of America
Washington DC, January 2008

Cognitive Models for Parametric Design

Universidad La Salle, Mexico City, November 2007

Symmetry Studies in Frank Lloyd Wright's Textile Block Houses

Technical University of Frankfurt
Frankfurt, Germany, September 2007

Gothic Rebuilt

Summer Institute of Architecture
School of Architecture and Planning. The Catholic University of America
Washington DC, June 2007

On Structural Systems and Structural Design (invited)

Comprehensive Building Design Studio
School of Architecture and Planning. The Catholic University of America
Washington DC, February 2007

What is Design Computing?

Summer Institute of Architecture
School of Architecture and Planning. The Catholic University of America
Washington DC, July 2006

Design Procedures

Design Computation Lecture series
Department of Architecture. Massachusetts Institute of Technology
Cambridge, MA, April 2006

Computational Design Solutions (series)

Department of Architecture
Massachusetts Institute of Technology
Cambridge, MA, January 2006

Counting Parametric Models

CAAD Futures 2005, Technical University of Vienna (TU Wien)
Vienna, Austria, June 2005

Parametric Gaudi

8th International congress of the Ibero-American Society of Digital Graphics, SIGraDi
Universidade do Rio Grande do Sul (UNISINOS), Sao Leopoldo, Brazil, November 2004.

Digital Design Fabrication (invited)

Universidade do Campinas UNICAMP, Campinas, Brazil, November 2004

Parametric Smart Geometry

Cambridge University, Cambridge UK, June 2003

Computers and Designers in Computer Aided Design (invited)

Universidad de los Andes, Merida, Venezuela, June 2002

Transitions, A morphological analysis on the recent work of Renzo Piano

Universidad de los Andes, Merida, Venezuela, July 2001

SELECTED TEACHING

Fluid Studio / Synthesis Studio (Clemson), *Clemson University*

ARCH 3510 Design studio for increasingly comprehensive design projects, with varied scales and programs, with an emphasis on pre-design, site design, sustainability, and collaborative processes. Emphasizes the relationship between architecture, site and context. Studio may be located in Clemson, Charleston, Barcelona or Genoa.

ARCH 4520 Integrates acquired skills, abilities, and interests from previous architecture studios. Projects emphasize the accumulation of architectural experiences and knowledge.

Building Processes and Technical Resolution *Clemson University*

ARCH 8470 Develops the designer's ability to assess, select and conceptually integrate structural systems, building envelope systems, environmental systems, life-safety systems and building service systems in a sustainable building design.

Design Science *Clemson University (NEW COURSE)*

ARCH 8790 Critical consideration of special topics in architectural technology from which students construct their own informed and reasoned ideas about what the topic means for their own developing architectural practices. May be repeated for a maximum of six credits

Graduate Design Studio III, *Clemson University*

ARCH 8510 addresses architectural problems with varied scales, programs and locations. Emphasizes the relationship between architecture and context. Projects involve collaboration in the studio and with other disciplines to result in architectural solutions for the built environment

Structures II *Clemson University*

ARCH 2710 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

Structures I *Clemson University*

ARCH 8700 Forces and their applications to statically determinate structural components and systems. Shear, moment and other stress-strain patterns are explored in multiple structural materials

Materials and Methods of Construction, *University of Central Florida*

Methods of assembling and selecting materials; detailed systems of construction are investigated. The course will concentrate on recent developments in fabrication technologies applied to the design and construction of complex geometry in architecture. Course topics include digital design, construction automation, building information modeling, digital mockups, digital fabrication, rapid prototyping, computer aided manufacturing, integrated product delivery, and design collaboration

Environmental Technology, *University of Central Florida*

Principles and practices relating to control of the thermal/atmospheric environment and plumbing in buildings. Environmental Technology 1 will focus on application of **Intelligent Kinetic Systems** and **Smart Responsive Environments**. The course will concentrate on recent development in ecology, design and digital fabrication developed in the early 21st century. Course topics include kinetic systems, digital design, responsive environments, and movable and deployable structures

Design Studio 8, *University of Central Florida*

Advanced design studio in UCF architecture program. This course focuses in morphology research and various aspects of digital design and digital media. Students are exposed to a variety of software for computational design

Design Studio 7, *University of Central Florida*

Advanced design studio in UCF architecture program. This course focuses in buildings in the city and presents various aspects of multi-story mixed-use building design. Students are exposed to a variety of case studies and precedents

Architectural Structures, University of Central Florida

Architectural Structures introduces basic concepts of structural mechanics applied to building structures. Through lectures and projects students are exposed to principles of structural design.

Parametric Modeling and Design, (NEW COURSE) University of Central Florida

Parametric modeling and Design is a new course offered as an elective for the architecture program in the School of Visual Arts and Design.

Shape Grammars, (NEW COURSE) University of Central Florida

This new course is proposed as an undergraduate upper-class elective in the School of Visual Arts and Design. Shape grammars looks at systematic approaches to creativity in design

Digital Media Advanced Graduate Studio, The Catholic University of America

Advanced design studio in the Digital Media graduate concentration. This course focuses in various aspects of digital design and digital media. Students are exposed to a variety of software for modeling, animation, visualization, video editing, and photorealistic rendering

Digital Fabrication Graduate Studio, The Catholic University of America

Advanced studio in the Design Technologies concentration. Students focus their attention on computational techniques and digital fabrication. This studio concentrates on the method of Euclidating Morphogenesis to analyze existing structures and generate the new designs.

Comprehensive Building Design Studio, The Catholic University of America

Capstone studio in the undergraduate program. This studio builds upon a broad base of design skills to explore in greater depth practical issues of architecture as a profession. Students work in teams to develop a mid-scale project to the level of Design Development and Construction Documents. A complete set of professional drawings and documents is expected

Design Morphology, The Catholic University of America.

This course explores the principles of morphogenetic design based on Euclidating Morphogenesis analysis of existing patterns from nature and built works. Past courses have explored the study of helicoidally formed structures in sea-shells, mollusks, and plants. The workshop explores the fundamental principles geometry, topology, symmetry, periodic arrangements and ruled based design, and studies their application to controlled experiments. Parametric driven modeling software and rapid prototyping machines are used for supplement

Structures I, The Catholic University of America

Structures I introduce basic concepts of structural mechanics applied to building structures. Through lectures and projects students are exposed to principles of structural design. Topics include structural analysis of beams, trusses and cables, load tracing, and lintels

Structures II, The Catholic University of America

Structures II focuses on strength of materials and mechanical properties of form. Topics include stress, and strain, moment and shear diagrams, moment of inertia, and load factors applied to steel and concrete structures. Analysis of beams and columns is presented

Advanced Structures, The Catholic University of America

Advanced Structures focuses on analysis and design of steel and concrete structures with an emphasis on frames. Additional topics include cables, continuous beam, indeterminate structures, lateral loading and seismic resistance.

Shape Grammars, *The Catholic University of America.*

This subject introduces a computational generative approach to design using shape grammars. Shape grammars are a formalism that provides powerful means for design analysis and synthesis, design exploration, generative design, and design languages. The class covers topics such as shape and shape-rules, symmetry, spatial relations, design derivations, and design evaluation. Case studies are presented to understand the application of shape grammars in design research, design analysis and their use in creative design.

Rapid Prototyping, *The Catholic University of America*

This course introduces students to principles and techniques for computer controlled fabrication. Topics include learning tools and software for desktop manufacturing, rapid prototyping and computer numerical control fabrication. Students are exposed to a variety of rapid prototyping devices through a series of weekly exercises, accompanied by selected readings.

Architectural Design Studio III, *Summer Institute of Architecture*

This core studio builds upon the conceptual foundations and tectonic knowledge to do projects of increasing scale and programmatic complexity. It promotes the student's ability to develop design solutions for human environments through a process of observation, analysis and synthesis. Emphasis is on the integration of different scale projects in the city. This could be from furniture to architecture or from urban design to building components. This studio focused on high-rise design

Digital Mockups: Digital Design of Super Tall Building

Co-instructor, MIT, Spring 2005

In collaboration with Foster and Partners, Arup R&D, SOM and KPF. London and New York City

This workshop explored digital design and fabrication systems for complex shapes and how they are applied to high-rise architecture. Parametric modeling software and rapid prototyping machines were used for exploration and development of building information models applied to the design of tall buildings. The workshop included field trips to London and New York

Design Fabrication Workshop: Design Fabrication with Frank Gehry

Teaching Assistant, MIT Spring 2004

Design workshop conducted in collaboration with the office of Gehry and Partners and Gehry Technologies. The class studied design solutions with fabric as a building material, parametric modeling, rapid prototyping and digital fabrication

Digital Design Fabrication

Teaching Assistant, MIT, Fall 2003/Fall 2004

Design Fabrication is an introductory course in advanced computing, rapid prototyping and building fabrication focused on the relationship between design, generative computer modeling and physical representation using digital fabrication devices. Computers and small rapid prototyping devices are used to simulate real world CAD/CAM processes. Tools and techniques taken from current research and practices using rapid prototyping are applied to the new design office, focused on how software and machines impact the design language and design practice

Parametric Tools for Design Development and Digital Fabrication

Workshop with Foster and Partners, London. Research Assistant Spring 2003

Supported the class with Catia software and Visual Basic scripting in Rhino. Design workshop done in remote collaboration with the *Specialist Modeling Group* of the firm of Foster and Partners. The workshop explored computational tools for generative designs, parametric modeling systems and digital design fabrication with rapid prototyping devices.

Introduction to Parametric Design

Instructor, January 2003

Developed tutorials for learning parametric design in Catia. Taught Parametric modeling in CATIA Version 5 Release 9 for a group of 20 students of the Department of Architecture and the Department of Civil and Environmental Engineering at MIT

Fabricating Ceramics

Workshop in collaboration with the TU Lisbon. Teaching Assistant, Fall 2002

Developed tutorials for learning parametric modeling. Supported the class with rapid prototyping devices and video conference. This workshop explored methods for fabrication of ceramic fabrication. It was done in collaboration with the Technical University of Lisbon

LEADERSHIP SERVICE

Clemson University

Academic Technology Committee

Faculty Search Committee

Scientific Committee of PARC journal (Research in Architecture and Urbanism, Brazil)

Reviewer for Design Studies (Journal)

Reviewer for American Society for Digital Graphics (SIGraDi)

Reviewer for Association of Computer Aided Design in America (ACADIA)

University of Central Florida

ACSA Faculty Councilor

Member of Faculty Search Committee

Member of Research Committee

Member of Scientific Committee of PARC journal (Research in Architecture and Urbanism, Brazil)

Expert Reviewer for Design Studies

Catholic University of America

Chair of Research

Chair of the Exhibits Committee

Member Curriculum Committee

Member Thesis Committee

Member Sustainable Committee

Member Technology Committee

ACSA Faculty Councilor

Massachusetts Institute of Technology

Vice-President of the Architectural Student Council (elected officer)

PhD Representative to the Architectural Student Council (elected officer)

Design and Computation Student - Faculty liaison

PhD Design and Computation admissions committee

Universidad de los Andes

Faculty Council Member, elected officer

Department Council Member, elected officer

PROFESSIONAL REGISTRATION

Venezuelan Engineers Association (CIV) Registered Engineer

Venezuelan Architects Association (CAV) Registered Architect

Currently seeking U.S. Architect registration in the State of New York

COMPETENCIES

COMPUTATIONAL DESIGN

Shape Grammars, Processing, Java, AutoLISP, Visual Basic, MEL, MAX Script, Rhino Script, VBA

PRODUCT LIFECYCLE MANAGEMENT & ENGINEERING

CATIA, Unigraphics, ProEngineer, SolidWorks, Digital Project, Master CAM, Multiframe, SAP2000, EcoTech

GEOMETRIC MODELING & BIM

Softimage, Alias, 3DStudioMAX, AutoCAD, Mechanical Desktop, MAYA, Rhino 3D, FormZ, Revit, Generative Components, Grasshopper

DIGITAL MEDIA

Photoshop, Premier, After Effects, Illustrator, Final Cut, Flash, Prezi

LANGUAGES Fluent in Spanish and English. Conversant in French, basic Italian and Portuguese

SPECIAL INTERESTS

FLIGHT

Hanglider, Paraglider and Sailplanes. Certified Paraglider instructor.

OUTDOORS

Mountain climbing, scuba diving, rafting, sailing.

MARTIAL ARTS

Aikido, Karate Do Shoto Kan, Tae Kwon Do, Ninjutsu

HOBBIES

Photography, astronomy, astrophysics, film, production design, gourmet cooking