Course Information
Number and title: Arch 436 - Advanced Modeling
Instructor info: Alphonso Peluso
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Prerequisite(s): DC3 or permission to take the course
Text and Materials: All course resources will be provided on the portal link below:
Tutorials Location: http://alphonsopeluso.com

Course description: This course will focus on 3D modeling of complex geometric components in Architecture and design. Concepts explored will concentrate on the advancement of digital design as an iterative process. Various modeling types covered are: Parametric Modeling, Generative Modeling, Responsive Modeling and Form Finding.

Goals: Develop an in-depth understanding of NURBS Modeling
Use architectural and structural texts as a guide/aid for learning complex 3D modeling.
Create complex parametric models based on text book concepts
Establish a deeper understanding of parametric modeling from the Midterm, Final and weekly assignment process and completion
Create form found parametric models
Develop a better understanding of the link between Virtual and Physical

Software: Rhino http://www.rhino3d.com/
Grasshopper http://www.grasshopper3d.com/
Paneling tools http://www.grasshopper3d.com/group/panelingtools
Karamba http://www.karamba3d.com/
Kangaroo2 http://www.grasshopper3d.com/group/kangaroo
Weaverbird http://www.giuliopiacentino.com/weaverbird/
Mesh + http://www.grasshopper3d.com/group/mesh

Students with Disabilities Statement: Americans with Disabilities Act (ADA) Policy Statement Reasonable accommodations will be made for students with documented disabilities. In order to receive accommodations, students must go through the Center for Disability Resources office. The Center for Disability Resources (CDR) is located at 3424 S. State Street, Suite 1C3-2, Chicago, IL 60616 telephone 312 567.5744 or disabilities@iit.edu.

Reading List:
Polyhedra Primer by Peter and Susan Pearce.
The Function of Form by Farshid Moussavi
Tragsysteme = Structure Systems by Heino Engel
Parametric Architecture with Grasshopper: Primer by Arturo Tedeschi
Innovative Surface Structures _ Technologies and Applications: by Martin Bechthold
Structural Engineering for Architects: A Handbook: by Pete Silver, Will McLean & Peter Evans

Grading: Students will submit 8 Homework assignments, Midterm, and Final
Final grade is based on the four percentages below:
10% for attendance (attendance is mandatory, signing in for someone and/or 3 unexcused absences will result in a failing grade)
20% for Homework assignments
30% for Midterm
40% for the Final

Please note: attendance, completion and submission of all course work on time is the minimum requirement and does not mean that you will receive an A grade. All grades are subject to the grade judging criteria below:

Grades are determined by judging 4 different categories:
Legibility - Make sure that your assignments are clear and easy to read. Use spell check (all software apps have it). Your portal page should be neat and organized with assignment #’s labeled. (see past homework examples on course portal page)
Composition - In addition to being legible you should apply all the concepts of composition that you have previously learned. Some suggestions including but not limited to are: all line drawings must demonstrate good line weights, assignments should include title and drawing names, all text should be placed with good layout & scale.
Innovation - Expand upon the skill sets taught in the course and apply them to the assignments. Research additional learning resources found on the Internet and in Libraries. Create your own way to apply the software tools and concepts discussed in the course.
Originality - Midterm and Final grades will weigh heavily on Originality. Strive to satisfy the requirements of the midterm and final assignments with creative and original solutions
Class Schedule

Week One:  Introduction _ Interface _ Geometry Types _ Nurbs
What is Rhino Grasshopper 3D?
What Is Grasshopper Good For?
Galapagos Evolutionary Solver

Week Two:  Build a Strong Foundation in Grasshopper
Generating Multiple Values
( Series ) _ ( Range ) _ ( Domain ) _ ( Random )
( Graph Mapper )
Generative Components
( Iso Trim ) _ ( Divide Domain 2 ) _ ( Morph Box )
( Surface Box )

Week Three:  Rhino 3D and Grasshopper 3D Surface Manipulation
Parametric Case Study -UnStudio Burnham Pavilion
Paneling Tools 2.5D
Paneling Tools 3D

Week Four:  Paneling Tools Effects _ Data Trees #01
Point Attractor, Curve Attractor, Srf Curvature Attract
Parametric Case Study - Absolute Towers Mad Arch GraphMapper
Parametric Shell Structure Tessellation
Parametric Folded Plate Tessellation
Midterm Assignment posted

Week Five:  Parametric Form Finding 01 _ ( Kangaroo )
ShellStar Pavilion by Matsys

Week Six:  Parametric Form Finding 02 _ ( Kangaroo )
Munich Olympic Stadium - Frei Otto
Icosahedron _ Pressure _ Weaverbird Plug-in

Week Seven:  Parametric Form Finding 03 _ ( Kangaroo )
Minimal Surfaces _ Collision

Week Eight:  Work in Class

Week Nine:  MIDTERM PRESENTATION
3D PRINT PRESENTATION

Week Ten:  Parametric Form Finding 04 _ ( Karamba )
( Weaverbird ) (Mesh + ) (Color)
ShellStar Pavilion by Matsys ( Redo )
Final Assignment posted

Week Eleven:  Parametric Form Finding 05 _ ( Karamba )
Chemnitz Stadium by Cecil Balmond
Galapagos Evolutionary Solver

Week Twelve:  Parametric Form Finding 06 _ ( Karamba )
Form Found Tower
Wind Analysis

Week Thirteen:  Parametric Form Finding 06 _ ( Karamba )
Structure Optimization

Week Fourteen:  Work in Class

Week Fifteen:  Work in Class

Finals Week:  FINAL PRESENTATION
3D PRINT PRESENTATION

*note: course syllabus & schedule are subject to change
Below is a list of the NAAB student performance criteria that is accomplished in this course

(The following is taken from 2014 Conditions for Accreditation)

**Realm A: Critical Thinking and Representation.**
Graduates from NAAB-accredited programs must be able to build abstract relationships and understand the impact of ideas based on the study and analysis of multiple theoretical, social, political, economic, cultural, and environmental contexts. Graduates must also be able to use a diverse range of skills to think about and convey architectural ideas, including writing, investigating, speaking, drawing, and modeling.

- **A.1 Professional Communication Skills:** Ability to write and speak effectively and use representational media appropriate for both within the profession and with the general public.

- **A.2 Design Thinking Skills:** Ability to raise clear and precise questions, use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test alternative outcomes against relevant criteria and standards.

- **A.3 Investigative Skills:** Ability to gather, assess, record, and comparatively evaluate relevant information and performance in order to support conclusions related to a specific project or assignment.

- **A.4 Architectural Design Skills:** Ability to effectively use basic formal, organizational and environmental principles and the capacity of each to inform two- and three-dimensional design.

- **A.5 Ordering Systems:** Ability to apply the fundamentals of both natural and formal ordering systems and the capacity of each to inform two- and three-dimensional design.

- **A.6 Use of Precedents:** Ability to examine and comprehend the fundamental principles present in relevant precedents and to make informed choices about the incorporation of such principles into architecture and urban design projects.

**Realm B: Building Practices, Technical Skills, and Knowledge.**
Graduates from NAAB-accredited programs must be able to comprehend the technical aspects of design, systems, and materials and be able to apply that comprehension to architectural solutions. In addition, the impact of such decisions on the environment must be well considered.

- **B.4 Technical Documentation:** Ability to make technically clear drawings, prepare outline specifications, and construct models illustrating and identifying the assembly of materials, systems, and components appropriate for a building design.