

## Course Information

**Number and title:** Arch 436 - Advanced Modeling

**Instructor info:** **Alphonso Peluso**

**E-Mail:** peluso@iit.edu

**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          | <a href="http://www.rhino3d.com/">http://www.rhino3d.com/</a>   |
| Grasshopper    | <a href="http://www.grasshopper3d.com/">http://www.grasshopper3d.com/</a>                                       |
| Paneling tools | <a href="http://www.grasshopper3d.com/group/panelingtools">http://www.grasshopper3d.com/group/panelingtools</a> |
| Karamba        | <a href="http://www.karamba3d.com/">http://www.karamba3d.com/</a>   |
| Kangaroo2      | <a href="http://www.grasshopper3d.com/group/kangaroo">http://www.grasshopper3d.com/group/kangaroo</a>           |
| Weaverbird     | <a href="http://www.giuliopiacentino.com/weaverbird/">http://www.giuliopiacentino.com/weaverbird/</a>           |
| Mesh +         | <a href="http://www.grasshopper3d.com/group/mesh">http://www.grasshopper3d.com/group/mesh</a>                   |
| Biomorpher     | <a href="https://www.food4rhino.com/app/biomorpher">https://www.food4rhino.com/app/biomorpher</a>               |

### 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](mailto: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 shared folder should be neat and organized with assignment #'s labeled **Firstname\_Lastname\_A0#**.

**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** - Assignments will weigh heavily on *Originality*. Strive to satisfy the requirements of the assignments with creative and original solutions

## Class Schedule

|                    |   |
|--------------------|---|
| <b>Week One:</b>   | Introduction _ Interface _ Geometry Types _ Nurbs<br>What is Rhino Grasshopper 3D?<br>What Is Grasshopper Good For?   |
| <b>Week Two:</b>   | Build a Strong Foundation in Grasshopper<br><b>Generating Multiple Values</b><br>( Series ) _ ( Range ) _ ( Domain ) _ ( Random )<br>( Graph Mapper )<br><b>Generative Components</b><br>( Iso Trim ) _ ( Divide Domain 2 ) _ ( Morph Box )<br>( Surface Box) |
| <b>Week Three:</b> | Rhino 3D and Grasshopper 3D Surface Manipulation<br>Parametric Case Study -UnStudio Burnham Pavilion<br>Paneling Tools 2.5D<br>Paneling Tools 3D  |
| <b>Week Four:</b>  | Paneling Tools Effects _ Data Trees #01<br>Point Attractor, Curve Attractor, Srf Curvature Attract<br>Intro To Galapagos Evolutionary Solver<br>Idea Shop Tour and Authorization<br><b>Midterm Assignment posted</b>  |
| <b>Week Five:</b>  | Parametric Form Finding 01 _ ( Kangaroo )<br>ShellStar Pavilion by Matsys<br>Galapagos Evolutionary Solver  |
| <b>Week Six:</b>   | Parametric Form Finding 02 _ ( Kangaroo )<br>Munich Olympic Stadium - Frei Otto<br>Icosahedron _ Pressure _ Weaverbird Plug-in  |
| <b>Week Seven:</b> | Parametric Form Finding 03 _ ( Kangaroo )<br>Minimal Surfaces _ Collision   |

|                       |   |
|-----------------------|---|
| <b>Week Eight:</b>    | <b>Work in Class</b>  |
| <b>Week Nine:</b>     | <b>MIDTERM PRESENTATION</b><br><b>3D PRINT PRESENTATION</b>   |
| <b>Spring Break:</b>  | <b>March 13 - 18</b>  |
| <b>Week Ten:</b>      | Parametric Form Finding 04 _ ( Karamba )<br>( Weaverbird ) (Mesh + ) (Color)<br>ShellStar Pavilion by Matsys ( Redo )                             |
| <b>Week Eleven:</b>   | Parametric Form Finding 05 _ ( Karamba )<br>Chemnitz Stadium by Cecil Balmond<br>Biomorpher Evolutionary Solver<br><b>Final Assignment posted</b> |
| <b>Week Twelve:</b>   | Parametric Form Finding 06 _ ( Karamba )<br>Form Found Tower<br>Wind Analysis   |
| <b>Week Thirteen:</b> | Parametric Form Finding 07 _ ( Karamba )<br>Structure Optimization  |
| <b>Week Fourteen:</b> | <b>Work in Class</b>  |
| <b>Week Fifteen:</b>  | <b>Work in Class</b>  |
| <b>Finals Week:</b>   | <b>FINAL PRESENTATION</b><br><b>3D PRINT PRESENTATION</b>   |

\*note: course syllabus & schedule are subject to change