

# Course Syllabus

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## A4535 Fundamentals of Digital Design

### Instructors

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### Seminar Time

Thursday 7-9 PM

Wood Auditorium

### Syllabus

This course will investigate modes of authorship and graphic communication in architecture and design. A wide range of imagery is used to conceive, coordinate and materialize the built environment and to map various types of information and data associated with it. The techniques of representation are not only a critical player in the communication of one's idea, but they become part of the study, problem solving, and aesthetic of that idea. Therefore, understanding the range of techniques and representational methods of architectural drawing is essential to both the development and realization of one's ideas.

Fundamentals of Digital Design investigates the concepts, techniques, and representational methods of computer aided 'drawing' in architecture. Students will study the operative relationship between 2D and 3D data, exploring the reaches of their analytic and representational potential. While the class is a foundational course in architectural computing, it will build on the student's advanced ability to question, shape and interrogate space and time.

The full semester course will be focused on a project that is generated primarily with the use of Rhinoceros and 3dsMax. After the initial development of a virtual model, we will investigate tools to further the analytic and representational capacity of the data within the model. Studies will be in the form of drawings, images and time based analysis.

There will be one assignment with three milestones. Each of these milestones will be posted on the class webpage for grading.

As a companion to the course lectures, the class will have weekly tutorial sessions. Tutorials are hands on sessions led by a video tutorial with one on one assistance by the course TAs. The tutorials will cover the concepts and techniques covered in the course lecture. There will be tutorial assignments which will be covered only during the tutorial sessions. Tutorial times will be coordinated with your studio TA and will start the first week of classes.

## **A4535 Fundamentals of Digital Design - Course Requirements**

### **Course Requirements**

- Attendance at lectures and tutorials
- Tutorial assignments
- Posting of all assignments and projects on course website
- Submission of archival quality images (2000x1500 pixels) on CD or DVD

### **Grading Criteria**

- 15% Completion of Tutorial Assignments
- 15% Assignment 01A\_Research
- 30% Assignment 01B\_Imagery
- 40% Assignment 01C\_Animation

### **Recommended Text, Blogs and Links**

*Architectural Geometry* (Helmut Pottmann, Andreas Asperl, Michael Hofer, Axel Killian)

*Digital Lighting and Rendering* (Jeremy Birn)

*Inside Rhinoceros 4* (Ron K.C. Cheng)

## **A4535 Fundamentals of Digital Design - Schedule**

**FALL '17 FuDD Lecture Schedule**

**Tutorial Schedule**

**WEEK 01 The Architectural Drawing**

9/7 Introduction to the Course

**WEEK 02 Orthographic Drawing - Pixels Points and Vectors**

9/14 Photoshop, Illustrator, Rhino

Photoshop, Illustrator, InDesign

**WEEK 03 Perspective Imagery (2D to 3D)**

9/21 Assignment 1a due  
Rhino, Illustrator, Photoshop

Barcelona Pavilion - Plan and Section & 3D Perspective Diagrams

**WEEK 04 Surfaces and Advanced Geometry**

9/28 Rhino

Panton Chair - Rhino

**WEEK 05 4D**

10/5 Introduction to 3dsMax

Park Cafe - Max

**WEEK 06 Subdivision Surfaces**

10/12 3dsMax

Barcelona Chair

**WEEK 07 Help Sessions**

10/19 In Wood

**WEEK 08 Materiality**

10/26 3dsMax, Photoshop

Barcelona Pavilion - Materials

**WEEK 09 Light and Shadow**

11/2 Assignment 1b due  
3dsMax

Barcelona Pavilion - Lighting

**WEEK 10 Analysis and Animation**

11/9      Generating Animated Content

Animation Tutorial

**WEEK 11 Compositing the Image**

11/16      Rendering, Layering, Superimposition

After Effects (optional)

**WEEK 12 Thanksgiving Break**

11/23      No Class

**WEEK 13 Desk Crits**

11/30      In Wood

**WEEK 14  
- 15      Assignment 1c Due**12/7 -      \*\*Final Material Submission due  
12/14      Sunday, 12/17 @ Midnight**A4535 Fundamentals of Digital Design - Assignment 01**

Assignment 01 is a three part, semester-long project. Choose a canonical, built or unbuilt work of architecture\* and study its detail. Within the study of an architectural detail, one will often find the genetic 'make-up' of its larger context. Whether these patterns within a building are material or immaterial, one will often find they transcend the various scales of the building. Isolation and abstraction of the minute allow one to re-evaluate the larger whole and understand it in a new way.

Initially students should research the plans, sections and detail drawing of their chosen building. In particular, students are encouraged to research buildings as a system looking carefully at its detail and the way it integrates into the whole. In most cases, the context of the detail will be critical for the analysis. Therefore, in most cases, the entirety or a majority of the building will need to be modeled through the course of the semester in order to complete the assignment.

You are encouraged to be creative regarding the interpretation of the definition of a detail. More importantly you are encouraged to study the meaning and value of images you produce. Beyond the pleasure of seeing, students are encouraged to challenge the visual experience and ask how our visual architecture culture works. How does it affect one's perception of the space? What information is embedded within? What is the genetic 'make-up' of the images we are producing and how do they relate to the whole? Does this image convey the essence of the project's idea?

The assignment will be completed in three parts with the following goal and deadlines.

### **Assignment 1A - Research**

Due September 22 - Posted to the class website

Create two 11x17 tiled board with scanned plans, sections, elevations, detail sections and perspective imagery of the canonical building you will study for the semester. Included in your graphic layout should be one annotated sectional drawing traced in Illustrator focusing on the specific detail you will begin within your detail analysis.

### **Assignment 1B - Imagery**

Due November 3rd - Posted to the class website

Use rendering, drawing, and compositing techniques to create three images of your project. At this milestone, your digital model should be near completion. The images produced should convey the system being studied as an isolated variable and how that system relates to the rest of the building. The following projections should be included:

Image 01 - 2000 x 1500 pixel - annotated section analysis

Image 02 - 2000 x 1500 pixel - annotated exploded axon analysis

Image 03 - 2000 x 1500 pixel - perspective imagery

### **Assignment 1C - Animation**

Due Date TBD on or around December 11 - Uploaded to specified location (TBD)

Time, the fourth dimension, provides the opportunity to study architecture as an animate entity. The program and systems of a building often have a complex relationship to their context. These relationships are often impossible to fully understand or identify in a single instance. Concepts such as these are most effectively documented through an aggregation of imagery in order to analyze the environmental changes at play. The final assignment is to create a digital animation of your building

### **Final Animation Requirements**

- TBD

Grading for all assignments will take into account both the difficulty and the execution of the assignment, as well as timeliness of submittal. Any problems uploading or submitting work by the due date should be reported to the course instructors.

\*Please note that personal projects, past and present will not be accepted for this assignment

Students can review work from prior semesters at <http://www.arch.columbia.edu>

All work for this semester will be posted on the course website