

Arch 427: 3D Modeling in CAD

Syllabus: Summer 2007

Instructor: **Thomas J McLeish** mcleish@iit.edu

Course Time: Tuesday + Thursday, 6:00-8:40

Introduction: As the final course in a series of classes devoted to digital modeling + image processing, this class will present advanced concepts and methodologies of digital based design for use in all phases of the design process. An emphasis will be placed on bringing the analog and digital realms closer together through concept, process + presentation; thus positioning the computer and digital media more intuitively in the students practice of architecture. As a result the students should become more adept at clearly articulated presentation of concept and form and understand principles behind new processes of fabrication, documentation and architectural experimentation made possible by the computer.

Course Objectives:

- To learn how to model complex objects and environments
- To learn how to setup simple dynamic structures in digital 3d space
- To develop broader range of possibility and more acute control over stylistic and aesthetic properties of digital media
- To learn new modes of digital presentation
- To learn how to teach yourself
- To develop more efficient modes of production which facilitate group projects, i.e. organization

Course Format: It is expected that all students taking the class have had both formal training + academic practice creating 3d models and 2d imagery from 3d models + digital/analog content. This is an advanced class and thus intermediate or better competency is expected at the beginning of the semester.

Throughout the semester, lecture and tutorial will be delivered which demonstrate a variety of means and methods for creating digital content in both 2d and 3d software packages. From the presented material, assignments will be issued as either isolated exercises or components of final project development. In addition to lectures, presentations + discussions, time will be allotted as necessary and open lab time will complete the duration of the class meetings, providing students with one-on-one or group help sessions.

To expand the breadth of the class beyond the delivered content, students should (and are inherently expected to) diligently exercise the following practices:

Exploring Your Tools - Training oneself to experiment with menu options, parameter changes, and buttons in order to gain a further understanding and expanded skill set within an application. If you don't completely know what a function of a program is for, and you notice or pass it frequently, use it, see if you can figure out what it is for. Chances are, if it made it through the software development process it performs a useful function. Who knows, it could become one of your most frequently used functions.

Finding Help - Each week key words will be provided for navigating appropriate software package help offerings and online keyword searches. This will serve as the foundation "support" material, with tutorial references, descriptions + definitions or examples of work. These pointers replace the need for any purchased reference material. The reality is, most of the software we will be using has been around for many years, and as a result very thorough documentation has been developed by the maker to educate users in how to take advantage of their product. In fact, most of the literature available at a bookstore is a simple regurgitation of descriptions, tutorials, etc (available for free to registered users) with a thin, often poorly written commentary. Advanced users must be able to teach themselves if they wish to take their skills further.

Project: Content for skill development will come from current and previous studio projects. The more challenging the problem you choose to tackle, the more you will gain from this course. Several assignments will be components of project development, which will aggregate over the course of the semester ultimately progressing to a final project presentation at semester's end.

Labs: Each week, we will complete a lab in class on a specific topic. These labs will be posted to your website by the next class session. You must be in class to complete the lab.

Arch 427: 3D Modeling in CAD

Assignments: Out of class assignment will be delivered for completion by the next class session. These assignments will either be exercises in specific functions/methodologies and/or components of project development. Given the nature of weekly development it is crucial for the success of both individual and any group aspects that progress be maintained. Each assignment will be required to be posted to the student's personal website by the start of the next week's class period. Completion will be evaluated and recorded. Completed assignments will serve as the foundation for grading.

Grades: Letter grades will be administered based on completed assignments and labs. Each on time, properly completed assignment will earn a set amount of pts. Each on-time, properly completed lab will earn 1 pt. At the end of the semester all pts will be added up and grades issued based on percentage of available points. Missed assignments or incomplete assignments can be completed prior to the upcoming presentation for ½ point credit. Labs cannot be made up.

Attendance: Attendance will be taken at the beginning of every class. If you are late for the class without a legitimate excuse (see student handbook) this will count as half an absence. Four unexcused absences will cause your final grade to be reduced by one letter grade, five unexcused absences will result in two letter grade reductions and six or more unexcused absences will constitute failure for the course. Labs make up half of the point total for the course, labs must be completed in class, therefore attending class is imperative.

Backup: All students will be required to keep a backup copy of their work on thumb drive or other appropriate media. In the event that the server goes down or work is lost due to some computer failure the student will be expected to produce a backup copy of the work. Failure to produce a backup copy will result in a failing grade for the assignment. There will be no exceptions to these rules.

Website: All students will be required to maintain a web page dedicated to this course. If you foresee space problems, let me know 1 week in advance and I will take measures to increase you web space allocation. This is not a course on web design. I encourage a simple and accessible website. You are required to use the format I prescribe in the sample.

Suggested Texts: Appropriate text excerpts will be provided as necessary.

Arch 427: 3D Modeling in CAD

Course Outline [subject to change]:

Introduction to Arch427

- What is 3D modeling in CAD?
- Using the web to post progress images + assignments
- **Assignment 01: Your Arch427 Web Site**

Bricks

- Getting up to speed, polygonal modeling...
- 3d studio max interface + basic scene construction
- where its at and how it works
- navigating 3dsmax space
- working with objects
- materials and mapping, UV Mapping, material maps, tiles.
- rendering basics
- **Assignment 02 – see assignment list**

Wood

- 3d studio max interface + basic scene construction continued
- Importing from AutoCAD: Lines, Polylines, Layers, Blocks, User Coordinate Systems.
- Splines + meshes
- Working with sub-objects

Steel

- Drafting in MAX
- Coordinate Systems
- Arrays.
- Modifier stack - bend
- Dr. Frames 3D analysis tools - behavioral modeling.
- Generating Form from Dr. Frames.

Concrete

- Basic parametric models continued, a spaceframe using compound object-lofts.
- Arrays revisited.
- Compound objects - boolean, loft, etc.
- Cameras, and Lighting tutorial
- **Assignment 03: Model and render some aspect of your studio project [may or may not be entire project]. – see assignment list**

Digital Sketching

- Non-photorealistic imaging, 3D Sketching, Diagramming.
- Texture mapping coordinate systems revisited [environment, object, world, screen...]
- Export an EPS vector graphic
- **Assignment 04: Using your model from last week, generate some non-photorealistic images using techniques discussed in class. – see assignment list**

MAX Problem Solving Q+A on projects and Presentation Preparation

- Opacity maps and the alpha channel
- Photoshop Review: Layers, Masks, Opacity, Multiply, and Screen
- InDesign
- ACAD > InDesign && MAX > InDesign && Illustrator > InDesign ++ Printing
- **Midterm Evaluations: Website, lab[6 including today], and homework[4]**

Introduction to NURBS

- NURBS fundamentals: Creating + Editing Splines for surface creation, Surfaces, Splines from surfaces
- Photoshop Review: Resolution, PPI, Source, and Output

Arch 427: 3D Modeling in CAD

- **Assignment 05: Using NURBS, model a ceramic bathroom fixture [or project appropriate component] with complex curves. Demonstrate 3 variations using the parametric properties of NURBS in MAX. – see assignment list**

Introduction to Animation

- Keyframes, Motion Controllers, Auto Key + Set Key
- Lights, Geometry, Camera
- Walkthrough

Introduction to Animation Continued

- Animatable Parameters: Objects, Lights, Cameras, Systems, Materials, Maps
- Graph Editors
- **Assignment 06: An Illuminating Animation. – see assignment list**

Dynamic Systems with Reactor

- Rigid Body Systems, Soft Body Systems Cloth Systems
- **Assignment 07: Use Dynamic Systems to Generate an Architectural Form. – see assignment list**

Advanced Materials, Radiosity, Light Tracer, and Photoshop

- External References in MAX
- Material properties and associated map parameters
- Light tracing
- **Assignment 08. – see assignment list**

Flash

- Introduction to Flash: Assembling a slideshow
- movieclips, layers, symbols, timeline, keyframes, tween, actionscript...
- [Click and activate to use this control]
- Google and Flash content
- **Assignment 09: Create a slideshow of your class work using blended transitions; provide navigation controls including: stop, play, and go to a specific slide [do not use the pre-packaged slideshow maker]. – see assignment list**

Efficiency in Rendering and Presentation Preparation+ Web Review

- Presentation Issues
- InDesign
- Illustrator
- Photoshop
- **Assignment 10: Prepare and post a final presentation image/board of your project.**

Presentation Preparation Continued

- Presentation Issues
- InDesign
- Illustrator
- Photoshop
- Printing