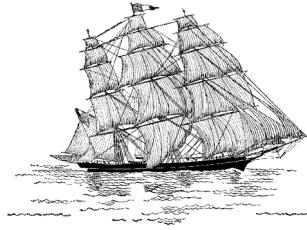


Architecture 307: Digital Tools for Architecture

TENTATIVE Course Description and Syllabus for Spring 2007

Updated 10 July 2007



General Description

Computers can be powerful tools in design, however, they require skilled, creative users to fully realize the system's potential. Architecture 307 is intended to introduce architecture students to this force of change. We will explore several topics in the course: building information modeling (using Revit), emerging technologies (CAD/CAM), analytical modeling (such as solar geometry and structural calculations), and creating an online portfolio (Dreamweaver). The exact content of the course and ordering of the lectures may change due to the availability of guest speakers and facilities.

The content of the class will be split roughly into two parts: lecture and lab. Lectures will cover a range of topics from raster and vector graphics to the concept of the virtual building. A final exam will test this knowledge. Hands-on lab sessions will introduce students to many programs that illustrate the concepts discussed in lectures. Homework assignments will expand on this information. Please note that the exact software programs taught are dependent on course objectives for each semester; please talk with the instructor if you have questions about specific programs. As the course focuses on graphic applications, it is equally applicable to engineering, film, cinema, theater, and others who have an interest in two-dimensional and three-dimensional computer modeling and rendering.

Architecture 307 (# 11221 R) is a two unit class that only meets for the **second** half of the semester. You must sign up for the class before add date at the beginning of the semester. Your final grade in the course will be based on the homework (65%), final exam (25%), and course participation (10%).

Homework Assignments

Assignments are usually one week in duration; although usually due Wednesdays, please consult the dates on the syllabus for the specific due date for each assignment. **Late assignments will not be accepted; turn in what you have on the due date.** It is crucial that you turn in whatever you have done on the due date; the assignments build upon each other. There are five homework assignments. Grades will be posted on Blackboard at totale.usc.edu. Students are strongly encouraged to come by with work in progress for suggestions before the assignment is due and come by after grading to learn how they could improve in the future.

Required Items

You will need methods for backing up your assignments and for occasionally turning them in. I recommend portable hard drives and Flash drives. Do not just have one copy of your assignment! Have multiple backups! Label all media with your name and e-mail address. Bring the Flash drive to class each day with your current files.

A USC e-mail account is required for this course. Go on-line and verify that your USC account is working. Call 0-5555 if you have problems accessing your account. You will need to use your **USC account** for posting some assignments and for reading your email. Read your e-mail at least once a day!

There will be a Reader for the course that contains reference material about the software that we will be using. Additional general interest readings will be on reserve at the AFA library.

Software for the Class

If you have your own computer, please download the following software. Contact Enrique if you have problems (ebarajas@usc.edu). The software will also be available for those who do not own a computer. Unless otherwise listed, these programs only run under **Windows**.

important

Revit Architecture (free), students.autodesk.com -- we will be using this program first!

sun, drawsun, Atlas (all free): will be posted on Blackboard

Climate Consultant 3 (free program - Mac OS-X and Windows), <http://www2.aud.ucla.edu/energy-design-tools/>

HEED (free program - Mac OS-X and Windows; good for residential), <http://www2.aud.ucla.edu/energy-design-tools/>

Weather Tool 2.00 (free demo), <http://www.squ1.com/downloads>

ECOTECT 5.50 (free demo), <http://ecotect.com/home>, <http://squ1.com/downloads>

Optional (these are not needed for class, but you might be interested in them)

Revit Structures, students.autodesk.com

DesignBuilder (30 day evaluation copy, Windows only?), <http://www.designbuilder.co.uk/>

Required Readings

These readings are available on reserve at the AFA library under KENSEK. Please note that you never read the entire book. You should check with this list to see what the assigned pages are for each book. Other readings will be put on reserve if additional appropriate material becomes available. Please keep up with your readings. They look longer than they actually are – there are lots of pictures. In the past, students had mentioned that they wished that they had at least looked at the readings sooner as they gave some ideas for their studio projects.

Burphy, Mark (editor): **Cyberspace: the World of Digital Architecture**, copyright 2001, NA 2700.C93. “Introduction” (Burphy, pp. 7 – 9). **Skim** the entire book.

Kolarevic, Branko (editor): **Architecture in the Digital Age: Design and Manufacturing**, copyright 2003, NA2543.T43 .A724. “Chapter 3” (Kolarevic, CAD/CAM) and “Chapter 8” (Glymph, Disney Concert Hall).

Leach, Neil (editor): **Designing For A Digital World**, copyright 2002, NA 2543.T43.L43. “Introduction” (pp. 6 - 14). “E-Bodies, E-Building, E-Cities” (Mitchell, pp. 50 – 56). “Architecture = Space = Interface” (Rashid, pp. 134-137, Asymptote projects).

Liu, Yu-Tung (editor): **Developing Digital Architecture**, 2002 FEIDAD Award, copyright 2003, NA 2543.T43.D46. “Rethinking Digital Architecture” (Liu, pg. 7). “Award Projects” (pp. 46 – 52). **Skim** the entire book. (pg. 144 – rethinking the apartment in the age of advertising and pg. 184 – rethinking Los Angeles)

Liu, Yu-Tung (editor): **Diversifying Digital Architecture**, 2003 FEIDAD Award, copyright 2004, NA 2543.T43.D645. “Ubiquitous Digitality” (Liu, pg. 7). “Award Projects” (pp. 78 – 82). **Skim** the entire book.

Onuma, Kimon: *The 21st Century Practitioner*, copyright 2006. On CD. Onuma_V4b.pdf

Szalapaj, Peter: **CAD Principles for Architectural Design**, copyright 2001, NA2728.S97. “Part 2: chapters 2 – 9” (analytical modeling).

Reference Materials: this information is available in your Reader.

Need information on HEED and ECOTECT (November 14th)
Revit Massing (October 29)
Revit Topos (October 29)

Course Description and Syllabus

Homework Assignments

Four term sheets: Building Information Modeling; Web Page Authoring; 3D Digitizing and CAD/CAM; Analytical Modeling

“The 21st Century Practitioner: Transformed by Process and Software” (Kimon Onuma). This is also posted in color on Blackboard (Onuma_V4b.pdf)

"Autodesk Revit Preview Guide"

"Getting Started with Autodesk Revit 5"

"Getting Started with Autodesk Revit 9"

“Raise the Roof! Creating Roofs in Autodesk Revit Building” (Scott Davis and Scott Brown)

“Revit Structure and BIM” (www.autodesk.com/structure)

"Basic Web Design Principles"

"Demystifying Web Page Construction"

"Rapid Prototyping Machines" (LiWei Shen)

"CNC Milling" (<http://www.cadcamnet.com>)

"Rapid Prototyping Lab" (Khoshvevis)

User's Guide to the Building Design Advisor (tutorial chapter only)

PLEASE NOTE THAT YOU ARE EXPECTED TO COMPLETE ALL HOMEWORK ASSIGNMENTS BY YOURSELF USING THE SOFTWARE THAT HAS BEEN ASSIGNED. COPYING OTHER PEOPLE'S FILES OR TURNING IN WORK THAT YOU DID COMPLETE YOURSELF WILL RESULT IN A FAILING GRADE.

INTRODUCTION TO THE CLASS AND BUILDING INFORMATION MODELING

**** Bring your Reader to class. Also bring all files we create to class on a Flash drive.**

October 17, Wednesday	WPH B36	<p>Lecture: Introduction, Administration, Course Overview Pick up course description with syllabus and assignments List of software to download Lab: Introduction to Revit; start "Getting Started with Autodesk Revit 5"</p> <p>Homework 1: Introduction to Revit, "Getting Started with Autodesk Revit 9"</p> <p>Read: Onuma, Kimon: <i>The 21st Century Practitioner</i></p>
October 22, Monday	WPH B36	<p>Lab: Finish <i>Getting Started with Autodesk Revit 5</i> Changing the border – using the family editor Bring extra course descriptions with syllabi and assignments</p> <p>Reader: "Autodesk Revit Preview Guide" Reader: "Revit Structure and BIM" (www.autodesk.com/structure)</p>
October 24, Wednesday	WPH B36	<p>Lecture: What is BIM?</p> <p>Homework 1 due Homework 2: Creating a BIM Model</p> <p>Term sheet: Graphics, Modeling, and BIM</p>
October 29, Monday	WPH B36	<p>Lab: Continuing with Revit contours, families, roofs, massing</p> <p>Reader: "Raise the Roof! Creating Roofs in Autodesk Revit Building" (Davis and Brown) Reader: need massing handout Reader: need topo handout</p> <p>Read: "Cyberspace: the World of Digital Architecture" (Burry)</p>
October 31, Wednesday	WPH B36	<p>Lab: Continuing with Revit</p> <p>Read: "Developing Digital Architecture" (Liu) Read: "Diversifying Digital Architecture" (Liu)</p> <p>Homework 2 is NOT due (keep working on it, it is worth 20 points)</p>

COMPUTER AIDED DESIGN / COMPUTER AIDED MANUFACTURING

November 5, Monday WPH B36 Lecture: Computer Aided Design / Computer Aided Manufacturing

Reader: "Rapid Prototyping Machines" (LiWei Shen)

Reader: "CNC Milling" (<http://www.cadcamnet.com>)

Reader: "Rapid Prototyping Lab" (Khoshvevis)

Term sheet: 3D Digitizing and CAD/CAM

November 7, Wednesday **TBA**

Lab: Using the laser cutter / 3D printer / 3D scanner?

Homework 2 due

Homework 3: Introduction to CAD/CAM

Read: "Architecture in the Digital Age" (Kolarevic): Chapter 3

ANALYTICAL MODELING AND SPREADSHEETS

November 12, Monday **WPH B36**

Lecture: Analytical Modeling

Lab: show Climate Consultant, Weather Tool

Excel sun path diagram, sun, drawsun, and Atlas

BRING LAPTOP TO CLASS (with software)

Read: "CAD Modeling and Analysis" (Szalapai)

Part 2: chapters 2 - 9

Term sheet: Analytical Modeling

November 14, Wednesday **WPH B36**

Lab: Software Tools for Analytical Modeling

BRING READER TO CLASS

BRING LAPTOP TO CLASS (with software)

Reader: HEED

Reader: ECOTECH

Homework 3 due

Homework 4: Analytical Modeling

THE INTERNET AND WEB SITE DESIGN

November 19, Monday	WPH B36	Lecture: The Web and Internet Resources browsers, plug-ins, html, vrm, etc. Show examples of student portfolios; show a content management system Use html to make a simple site Internet Resources, wikis, blogs, podcasts Reader: "Basic Web Design Principles" Reader: "Demystifying Web Page Construction" Term sheet: Web Page Authoring
November 21, Wednesday	WPH B36	Lab: Introduction to web page authoring Dreamweaver text, links, frames, layers, table image map, rollover, transparency, disjointed rollover Homework 4 due Homework 5: Creating an On-line Portfolio
November 26, Monday	Watt 7	Lab: podcasting Create a podcast in class Read: "Designing for a Digital World" (Leach) "Introduction", pp. 6 – 14 "E-Bodies, E-Building, E-Cities", pp. 50-56 "Architecture = Space = Interface", pp. 134 – 137
November 28, Wednesday	WPH B36	Lab: file transfer Review of concepts. Posting a Web page. In-class exercise: post homework 5 Homework 5 due

PREPARING FOR THE FINAL EXAM

December 3, Monday	WPH B36	Lecture: Review of 2D and 3D modeling, Curves and NURBs
December 5, Wednesday	WPH B36	Final exam review including discussion of readings
December 17, Monday	Watt 1	Final exam, 8 – 10 am

Please read.

REHABILITATION ACT (LAB 504) AND THE AMERICANS WITH DISABILITIES ACT (ADA)

The University of Southern California is committed to full compliance with the Rehabilitation Act (Lab 504) and the Americans with Disabilities Act (ADA). As part of the implementation of this law, the University will continue to provide reasonable accommodation of academically qualified students with disabilities so those student can participate fully in the University's educational programs and activities. Although USC is not required by law to change the "fundamental nature of essential curricular components of its programs in order to accommodate the needs of disabled students," the University will provide reasonable academic accommodations. The specific responsibility of the University administration and all faculty serving in a teaching capacity is to ensure the University's compliance with this policy. The general definition of a student with a disability is any person who has "a physical or mental impairment which substantially limits one or more of such person's major life activities," and any person who has "a history of, or is regarded as having, such an impairment." Reasonable academic and physical accommodations include but are not limited to: extended time on examinations; substitution of similar or related work for a non-fundamental program requirement; time extensions on papers and projects; special testing procedures; advance notice regarding book list for visually impaired and some learning disabled students; use of academic aides in the classroom such as note takers and sign language interpreters; early advisement and assistance with registration; accessibility for students who use wheelchairs and those with mobility impairments; and need for special classroom furniture or special equipment in the classroom.

Obtaining Accommodations

Physical Accommodations

Students with physical disabilities should contact Disability Services and Programs (DSP) prior to or during the first week of class attendance or as early in the semester as possible. The office will work with classroom scheduling, the course instructors and their departments, and the students to arrange for reasonable accommodations.

Academic Accommodations

Students seeking academic accommodations due to a physical or learning disability should make the request to the course instructor prior to or during the first week of class attendance, as well as registering with DSP as early in the semester as possible. Course instructors should require that a student present verification of documentation when academic accommodations are being requested. For assistance in how to provide reasonable accommodations for a particular disability, course instructors are encouraged to consult with Disability Services and Programs (DSP). Students requesting academic accommodations who do not have DSP documentation should be referred to that office.

Disability Services & Programs contact: (213) 740-0776

RELIGIOUS HOLIDAYS

The University of Southern California recognizes the diversity of our community and the potential for conflicts involving academic activities and personal religious observation. The University provides a guide to such observances for reference and suggests that any concerns about lack of attendance or inability to participate fully in the course activity be fully aired at the start of the term. As a general principle students should be excused from class for these events if properly documented and if provisions can be made to accommodate the absence and make up the lost work. Constraints on participation that conflict with adequate participation in the course and cannot be resolved to the satisfaction of the faculty and the student need to be identified **prior to the drop/add date for registration**. After the drop/add date the University and the School of Architecture shall be the sole arbiter of what constitutes appropriate attendance and participation in a given course.