**ARCH 2472: Architectural Modeling and Media 2**

**Fall 2012**

**SYLLABUS**

**Course Description**

This course is an introduction to design computing and to the relationship between manual and digital drawing. The basic premise of the course is that of linking architectural practices that involve space, light, movement, the path of the sun, etc. to digital modes of study and representation. This introduction is aimed at fostering the development of cognitive and design practices that use digital media in a constructive and substantive way, so that the student may begin to think architecturally in the digital/electronic realm. The second premise of the course is that all digital media share certain basic conventions between them. So, for instance, learning how to work in Adobe Illustrator, prepares one to work and think in the environment provided by Rhino. There are a lot of similarities and analogies between software and being aware of them allows us to use one, or more media in the conception, representation and promotion of architectural projects. The course, as introduction, will highlight the common elements between software that the students will use, and will become more proficient users, or experts in the future.

This particular section of the course addressing sophomore students is conceived and delivered in a sequence that corresponds to the assignments, concepts, skills and ideas taught in Studio. In some instances this relationship is that of complementing the content and requirements of the studio, sometimes there will be an antithesis drawn between two modes of thinking and of representation, and most of the time the relationship will be evident and will stand as a complement to Studio work.

The basis of architectural drawing and representation is that of projection. Projection is a method by which we depict a three-dimensional object in two dimensions while trying to maintain, as much as possible, most of its constituent properties and characteristics. Projection and geometry go hand in hand and, as you will see, manual modes of representation are limited by the tools available and by the fact that we rely entirely on Euclidean geometry for the description of spaces, materials and structures. Digital media, on the other hand, allow us to explore complex forms, to manufacture and build with the use of machines that interpret our drawings in real materials in the real world. The most productive use of digital media is achieved when we are able to use this technology and to integrate it in our way of thinking as a set of cognitive and computational extensions, prostheses, to our minds and bodies.

Digital and manual media are based primarily on Euclidean Geometry and on a system of orthographic projections. In the instances where we deal with the intersection of solids of varying forms, we resort to descriptive geometry. In my opinion regarding the use of geometry, manual media privilege an intelligible approach to design. (By intelligible I mean that we have to know Euclidian Geometry and Descriptive Geometry in order to draw, and conceive our designs) Digital media, on the other hand privilege an approach that relies more on perception. We perceive that we draw circles, intersect solids, etc. but we don’t have to know how this happens. (We don’t have to know the rules of math and geometry behind the operations). The necessary knowledge lies in the computer and in the software. It is “blackboxed”. The designer inputs data and the program outputs results. This is a very exciting time for all of us and the more we learn, the more we enjoy the variety of means for design, representation, implementation and thinking that our current technological development affords us.

The students will be introduced to different software that work primarily with vectors, bitmap images, solids and surfaces, and if there is time toward the end, with animations. The instruction will be based in drawing parallels between different programs and in demonstrating to the students the common logic behind a lot of the software architects use. For instance, Boolean operations (based on mathematics and set theory) are common to programs such as Photoshop, Illustrator, Rhino, etc.

**Course Objectives and Learning Outcomes**

1. To foster the development of cognitive and design practices that use digital media in a constructive and substantive way, so that the student think architecturally and design in the digital/electronic realm.
2. To highlight the common logic and common elements existing in different software programs that the students will use, so that students become more proficient users in the near term, or experts in the longer term.
3. To coordinate assigned tasks with the desired development of projects in the contemporaneous studio, so that students learn to shuttle effectively between design conception and representation.

4. To introduce digital tools as cognitive and computational extensions—prostheses—to our minds and bodies, so that students use them efficiently and to their full capacity.

**Course Procedure and Organization**

The course is organized around two meeting times per week. The first meeting, on Tuesdays, consists of a lecture. Most of the time these lectures will focus on cultural, architectural and material issues as those pertain to digital design media. During this time the instructor will introduce the assignment of the week and will demonstrate the key moves necessary to complete the assignment. For most of the assignments PDF files will be available to the students demonstrating the process used and the major commands. The second meeting, on Thursdays, is “lab” time. During this time each student will occupy a workstation and work will be done for the completion of the assignment. The instructor and the Graduate Teaching Assistant will be there to assist the students and to answer questions. As the semester progresses and the overlap between the course and the studio intensifies, some of the questions and issues arising from the assignment will be clearly related to the production of Studio work.

The particular challenge of teaching and of being a student in this course is related to the different levels of expertise that the students possess. This is especially evident at the beginning. Some of you may find at times some of the assignments and some of the instruction difficult, while others may find the same material easy and redundant. The goal is to have all students reach a similar level of competency and understanding at the end of the semester. Please be patient, ask for help and help each other. Please do not hesitate to ask questions!

Most architects and artists using digital design media know that in order to achieve their design goals they need to use a whole series of different software. Despite their many similarities, not all programs perform in the same way, so we need to know what to use in order to achieve our desired outcome. More often than not we “jump” from one to the other in order to complete a task. The course will replicate part of this process. For instance, we may use 3dmax only for the construction of topographical models and for studies of the sun as it moves during the different seasons over the same site and building, Illustrator as a means of presenting this study and Rhino as a means of producing floor plans, sections, etc.

The class assignments are due on the date posted in the individual assignment sheets. The course will have a folder dedicated to it in the School intranet system. Your completed work will be submitted in that folder unless otherwise specified. Students are required to submit the original files of their work, in the software assigned for each exercise. For instance, if you are asked to create a movie of the shadows created on a particular building (using 3dStudio), you will have to submit both the movie and the original file from which the movie was created

**Course Requirements**

Regular attendance is mandatory. The successful completion of this course entails the successful completion of about ten assignments. There is no final exam. Instead, as final exam I will consider your final studio presentation and the demonstration of the different skills and insights you have culled from this course. The final assignment is considered to be part of your final studio presentation. Each assignment is equally weighted and the final assignment is 30% of your grade.

**Grading**

Ten assignments @ 7% each 70%

Final assignment 30%

TOTAL 100%

**Evaluation Criteria / Policy on Absences**

Three unexplained absences will result in the loss of one letter grade. Assignments are due when noted in the syllabus. We will be looking at the way your files are structured, saved and printed. We will also be looking at how well a student followed the instructions for the assignment and, most of all, how a student went “beyond the basic requirements of the assignment”. Other criteria for evaluation include the timely completion of the assignment, the thoroughness and neatness of execution and the inventiveness and imagination in the execution of each assignment. This is specifically pertinent to the last assignment that is immediately related to the production of studio work and the completion of the semester. *Remember: Grades are earned by you, not given by the instructor.*

The general grading policy is as follows:

* A grade of “F” indicates a failure to meet the class requirements, including attendance, minimum requirements concerning presentation and fulfillment of class requirements.
* A grade of “D” means that you have significant attendance problems, your class performance is poor, including failure to meet deadlines, the basic requirements of the class, and/or your assignments are completed in a minimal manner.
* A grade of “C” means that you have not met the basic requirements of the studio, but your assignments are minimally done and display little competency.
* A grade of “B” means that you have met the basic requirements of the class and that your assignments are developed well.
* A grade of “A” means that your work represents both a clear understanding of class themes and criteria, *and a self-motivated exploration beyond the basic course requirements*. Projects that receive grades of “A” are exemplary projects in terms of concept, production, and craft.

Midterm grades will be assigned and your instructor will notify/counsel any student concerning any necessary action to be taken concerning the semester Drop Day. Please refer to the Institute handbook regarding disputes concerning grades.

**Course Schedule – Topical Outline**

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| --- | --- | --- | --- |
| **wk** |  |  |  |
| **1** | ***august*** | ***21*** | Introduction - Assignment 1: Construct a polyhedron using chipboard. |
|  |  | ***23*** | Students print nets - make models |
|  |  |  |  |
| **2** |  | ***28*** | Case Study – Assignment 2: Material study of Barcelona Pavilion |
|  |  | ***30*** | Students organize resources – illustrate plan with material reference diagram |
|  |  |  |  |
| **3** | ***september*** | ***4*** | Rhino Interface – Updated assignment schedule after skill level assessment period |
|  |  | ***6*** | Import content from Photoshop and Illustrator and prepare for layout using Rhino |
|  |  |  |  |
| **4** |  | ***11*** | Rhino Points, Lines, and Curves |
|  |  | ***13*** | Prepare line work for print and foundation for 3d models |
|  |  |  |  |
| **5** |  | ***18*** | Rhino Objects |
|  |  | ***20*** | Build 3d model of Barcelona Pavilion |
|  |  |  |  |
| **6** |  | ***25*** | Vray |
|  |  | ***27*** | Setup materials and lighting for 3d model renders |
|  |  |  |  |
| **7** | ***october*** | ***2*** | Rhino Surfaces |
|  |  | ***4*** | Create complex surfaces from curves and surface modeling operations |
|  |  |  |  |
| **8** |  | ***9*** | Rhino Plugins |
|  |  | ***11*** | Grasshopper, Section Tools, Grasshopper component installations |
|  |  |  |  |
| **9** |  | ***16*** | fall recess |
|  |  | ***18*** | Stereo lithography requirements, rendering compositing and optimization |
|  |  |  |  |
| **10** |  | ***23*** | 3D printing |
|  |  | ***25*** | Preparation and model checks for 3d printing |
|  |  |  |  |
| **11** |  | ***31*** | Laser Cutting |
|  | ***november*** | ***1*** | Preparation and line work checks for Laser Cutting |
|  |  |  |  |
| **12** |  | ***6*** | Rhino/Grasshopper |
|  |  | ***8*** | Parametric surface modeling and Paneling Tools |
|  |  |  |  |
| **13** |  | ***13*** | Grasshopper |
|  |  | ***15*** | Weave and L-systems |
|  |  |  |  |
| **14** |  | ***20*** | Grasshopper |
|  |  | ***22*** | Kangaroo, Lunchbox, Weaverbird, and Rabbit components |
|  |  |  |  |
| **15** |  | ***27*** | Final Project |
|  |  | ***29*** | Work on final project. |
|  |  |  |  |
| **16** | ***december*** | ***4*** | Work on final project. |
|  |  | ***6*** | Last day of in class work. Final Project to be submitted after the Studio’s final review. |

**Bibliography: Suggested Readings**

This course will rely on the readings assigned by the sophomore studio, software application help files and tutorials created by software publishers and users will often be given as assigned reading or viewing. Georgia Tech has also provided additional tutorials on the following website,

<http://www.lynda.gatech.edu/>

**PLEASE NOTE:**

1) Students with disabilities requiring special accommodations must obtain an accommodations letter from the ADAPTS Office [www.adapts.gatech.edu] to ensure appropriate arrangements. If you need special assistance, have a disability, or other issues, please let me know at the beginning of the semester.

2) Georgia Tech aims to cultivate a community based on trust, academic integrity and honor. Students are expected to act according to the highest ethical standards. For policy information on Georgia Tech's Academic Honor Code, please see [http://www.catalog.gatech.edu/rules\_regulations/#18].

3) All cell phones should be turned off during class and when entering the classroom.

4) In case of emergency (i.e. fire, accident, criminal act), please call the Georgia Tech Police at 894-2500. Please note that Perry Minyard, IT Support Administrator is also a firefighter and an Emergency Medical Technician (EMT) certified in performing CPR.

**Final Words:**

We are aware that all of you come to this class and to the studio with varying skills in terms design, representation and digital media. The goal of this academic year is to bring all students to the skill level required for future academic years.

As a result of these varying skills and levels of competence you will be frustrated at times; especially if you feel that we are covering material that you already know. We will greatly appreciate your patience in this matter.