ART 524: DIGITAL FABRICATION TECHNIQUES FOR ART AND DESIGN

() COURSE DESCRIPTION AND LEARNING OBJECTIVES ()

Developments in the fields of rapid prototyping and small-scale production have opened up new avenues for artists and designers to explore in the realization of their ideas. Computer-Aided Design (CAD) and Computer-Aided Manufacturing (CAM), while not new concepts, are becoming ever more accessible to those interested in making one of a kind objects. Micro-production models have developed which take advantage of these digital aids to production. Figuring out how to incorporate these technologies into the development of original and provocative work is a great challenge.

This course serves as a survey of contemporary digital fabrication techniques and their applications within the art and design fields. Through the development of three technical projects, students learn to develop designs using the computer and to fabricate elements of their projects using the school’s new machinery and off-campus fabricators. Students become versed in Rhinoceros through projects that build on one and other, beginning with a foundation in two-dimensional shapes and leading to the design of more complex three-dimensional forms. Following the same trajectory, the fabrication techniques utilized in the course will move from two-dimensions (laser cutting), to three dimensions (digital scanning, prototyping, and CNC machining). At the completion of the course, students will be familiar with a wide range of the digital technologies available to creative professionals. In addition to being able to design on the computer using Rhinoceros, the students also gain valuable experience communicating their ideas to each other and a fabricator.

@______ENROLLMENT POLICIES________

Prerequisites: 300- or 400- Level Art or Design Course
You must have taken and passed, with grade C or better, a 300- or 400- level Art or Design course in order to take this course. The basic understanding of working with materials and the design process are essential to your success in this course.

Enrollment in the course is limited to 15 people. This is because the course requires an incredible amount of student/teacher contact time and the facilities cannot safely accommodate any more students. If there is space available, or if it becomes available within the first week, the space(s) will be given to student(s) who are waiting to enroll. You must obtain a code from me, in order to register for the course.

¿OFFICE HOURS AND CONTACT INFORMATION?

Office Phone: 594-1589
Email: mghebert@mail.sdsu.edu
Office Location: Room A-106
Office Hours: Wednesday, 3 – 4pm* Or By Appointment
*Please, email me 24 hours ahead to schedule a meeting during my office hours.
[TOOLS OF THE TRADE]

Everyone needs a USB Drive (thumb drive, jump drive, keychain drive, memory stick, or whatever you want to call it.) This will come in handy moving files from computer to computer.

Depending on your project, you may need to buy your own bits for the CNC machines. We will try to avoid this, if at all possible, but it is a potential expense.

Additionally, the requirements of this course are the cost of materials required for each project. Some of these you will need to purchase yourself and others will be bought as a group in the course. The cost of materials and services for this course is predicted to be between 75-150 dollars. This depends greatly on the scale you chose to work in on each project. In addition to the money spent on materials you will be required to pay for the laser cutting required for the first project. I have estimated this to be about 30-40 dollars. I know that your budgets are tight, but as many of you know the making of physical objects is not cheap and we can’t work with terribly inexpensive materials within parameters of these projects.

00101010 : ACCESS TO DIGITAL FABRICATION LAB : 10110100

Lab fee: $45

This Lab fee goes into a fund to cover the buying of bits, spoil board materials, spare parts, repair, and the general upkeep of the facilities. If you are enrolled in the course you must pay the Lab Fee by the third class meeting. Checks and cash are acceptable for payment. Please make checks payable to Furniture Design Association.

Access to the Digi-Fab-Lab (FLab) will be very limited. In addition to class time, extra time may be assigned during the semester at my discretion. You must sign up for a time slot in order to use the labs and if you do not show up on time your time slot will be given to another student. Remember it is very important to come to your assigned time prepared. If you are not ready to start your job, your time slot may be given to another student. Please understand that we are doing the best we can to ensure access to the machines needed for the course.

/ BLACKBOARD/

Course materials will be posted on the course’s Blackboard site. You will find the the syllabus, project descriptions, supplemental materials for Rhino and RhinoCAM, and videos of my in-class demonstrations.

Additionally, we will be using the Assignment function on Blackboard to turn in the exercises for the course. I will demonstrate how to do this in class, the day that the first exercise is due.
Exercise A: Learning to Draw, Rhino Style – Due Tuesday, February 3rd

This exercise will serve as an introduction to the interface and drawing system in Rhino. For this assignment you will be given an image and you will be asked to trace over it using different rhino drawing tools.

Project #1: Dino-Mite – Critique Thursday, March 5th

The first project is to create small plywood model of an animal. Students will create complex cross sections of animal forms, which will be sent to a laser fabricator. Parts will be returned and assembled for critique. This project will introduce students to the 2D drafting in Rhino, bringing physical models into the software, and prepping files for a laser cutter.

Exercise B: 2-D Take-Offs – Due Thursday, February 26th

In this exercise students will bring an object and will analyze it and then draw two-dimensional projections of two views of the object in Rhino. This exercise will further introduce Rhino’s 2D tools.

Project #2: Puzzlin’ Evidence – Thursday, May 14th

The second project will introduce the TechnoCNC router and the RhinoCam software. Students will design and fabricate a small piece of furniture that will fit together without the use of hardware or glue. This project will introduce students to the creation of two and a half axis toolpaths, three axis toolpaths, and the proper use of one of the Techno CNC machine in the FLAB.

Exercise C: 3-D Take-Offs – Due Tuesday, April 21st

In this exercise students will select an object and will analyze it and then model it in 3-D in Rhino. This will further introduce the student to the 3D tools in Rhino.

Project #3: Registered Trademark– Thursday, May 14th

The third and final project is to model and print out a three dimensional form using the Dimension 3d Printer. The project focuses on learning advanced 3D modeling commands in Rhino, preparation of a file for printing, and the proper use of the 3D Printer.

Exercise D: The Day of Rendering is Upon You – Thursday, May 14th

This exercise will involve the creation of a scene in Rhino. You will learn how to assign materials, create lights, and to set up views in order to create a rendering.

Micro-Research Presentation – Presented in-class on March 17th and 19th

You will each do some research on a given 3D modeling or digital fabrication technique and present a short presentation to the class describing the technique and giving examples of the types of projects that people are creating with it. I will provide you with more details on this project in a handout that will be posted to blackboard.
... COURSE CALENDAR ...

Week 1:
Thu, Jan 22 - Introductions, Introduce Professor, and TA
Introduction and Discuss Course Syllabus and Objectives
Assign Exercise A: Learning to Draw, Rhino Style
Homework: Exercise A Demonstration

Week 2:
Tue, Jan 27 - Work on Exercise A
Thu, Jan 29 - Introduce Project #1: Dino-Mite
Homework: Project 1 Dino-Mite - Scanning and Drawing

Week 3:
Tue, Feb 03 - Project #1 Brainstorming Session
Thu, Feb 05 - Due: Exercise A: Learning to Draw, Rhino Style

Week 4:
Tue, Feb 10 - Assign Exercise B: 2-D Take-Offs
Thu, Feb 12 - Homework: Exercise B Demonstration: 2 Take-Offs

Week 5:
Tue, Feb 17 - Work Time
Thu, Feb 19 - In class trouble shooting of Dino-Mites
Homework: Demonstration: Assembling Your Model, Virtually

Week 6:
Tue, Feb 24 - Submit files to RMS Laser for cutting
Thu, Feb 26 - Due: Exercise B: 2-D Take-Offs

Week 7:
Tue, Mar 03 - Assign Exercise C: 3-D Take-Offs
Thu, Mar 05 - Critique Project #1: Dino-Mite

Week 8:
Tue, Mar 10 - In-Class Demonstration: TechnoCNC Router
Thu, Mar 12 - Work Time

Week 9:
Tue, Mar 17 - Micro-Research Presentations
Thu, Mar 19 - Micro-Research Presentations Continued
Homework Demonstration: Project 2 Test Parts

Week 10:
Tue, Mar 24 - Introduce Project #3: Registered Trademark
Thu, Mar 26 - Project #2: Test Parts Toolpaths Must Be Ready

Week 11:
Tue, Apr 07 - Group Discussion: Project #3
Homework: Demonstration Project #3: Doggy Demo
Thu, Apr 09 - Work Time
Week 12:
  Tue, Apr 14 - Work Time
  Thu, Apr 16 - Project #2: Toolpaths Must Be Ready by Today

Week 13:
  Tue, Apr 21 - Due: Exercise C 3-D Take-Offs
  Thu, Apr 16 - Project #2: Toolpaths Must Be Ready by Today

  Demonstration as needed

  Thu, Apr 23 - Work Time

Week 14:
  Tue, Apr 28 - Work Time
  Thu, Apr 30 - Work Time

Week 15:
  Tue, May 05 - Send First Batch of Project #3 to Printer
  Thu, May 07 - Send Second Batch of Project #3 to Printer

FINAL CRITIQUE FOR PROJECT #2 AND PROJECT #3 - THURSDAY, MAY 14TH @ 300 - 530PM
GRADING POLICY

Your grade in this course will be determined using the following criteria:

Deliverables (Beginning Students):
- Project #1 - 25%
- Project #2 - 25%
- Project #3 - 20%
Sub-Total: 70%

Participation: (Beginning Students)
- Micro-Research Presentation - 05%
- Exercises - 20%
- Participation in Classroom Conversations - 05%
Total: 100%

Deliverables (Advanced Students):
- Project #1A - 25%
- Project #2A - 25%
- Project #3A - 40%
Sub-Total: 90%

Participation (Advanced Students):
- Micro-Research Presentation - 05%
- Participation in Classroom Conversations - 05%
Total: 100%

Project Grades:

The grade for each project will be determined using the following criteria:

Conceptual Development - 15%
Based on how successfully you engaged with the concepts at the heart of the assignment.

Design Development - 35%
Based on how actively you worked on your design, did you engage in an iterative design process where your ideas were worked and reworked to make them as strong as possible.

Technical Execution - 35%
Based on how well you were able to execute your design. High attention to detail and well-developed craftsmanship will yield a higher mark in this category.

Presentation - 15%
Based on how well you present your ideas verbally and visually to the instructor and your fellow classmates during classroom conversations.
Late Projects:

Projects deemed to be incomplete during a critique will not be discussed during the critique and will be subject to a whole letter grade deduction given they are turned in before the end of the semester.

A>B>C>D>Final Grades:

Letter grades will be assigned to the total percentage earned by the end of the semester according to the following schedule:

- **A (-/+)**: 90-100%
- **B (-/+)**: 80-89%
- **C (-/+)**: 70-79%
- **D (-/+)**: 60-69%
- **F**: 0-59%

Statement Regarding Accessibility:

Students who need accommodation of their disabilities should contact me privately to discuss specific accommodations for which they have received authorization. If you have a disability, but have not contacted Student Disability Services at 619-594-6473 (Calpulli Center, Suite 3101), please do so before making an appointment to see me.