

Introduction to 3D Printing, Laser Cutting, and More

DANM 140 / ART 105

Summer Session 2 - 2015 Syllabus

Instructor: Nathan Ober - nober@ucsc.edu

Teaching Assistant: Sean Pace - space@ucsc.edu

Tuesday's & Thursday's: Lecture 10am to 1pm, Lab 2pm to 5pm

Classrooms:

Social Sciences 1 Mac Lab (<http://its.ucsc.edu/computer-labs/descriptions/socsci1-mac.html>)

DARC 306 (3rd floor studio space, Digital Arts Research Center)

DARC 225 (Prototyping Lab 2nd floor, Digital Arts Research Center)

Laser Cutting Lab (1st floor, Digital Arts Research Center)

Office Hours (by appointment):

Monday's & Wednesday's 1pm to 3pm

Extra Lab Hours: TBD

Course Description

Learn how to design functional objects, sculpture and other digitally inspired forms in a variety of 2D (Adobe Illustrator) & 3D applications (123D Design & Make, Sculptris, Meshmixer, etc.) then produce those models as physical objects with a variety of rapid prototyping methods including: 3D Printing, Vacuum Forming, & Laser Cutting.

Laptops are highly encouraged, but we will also have access to the computers in the Social Sciences 1 Mac lab as well as the computers in the Light-lab.

A Materials Fee of \$50 per student has been charged to your account, which covers costs of a variety of 3D printing material, acrylic plexi for the Laser Cutter & polystyrene for Vacuum Forming as well as other alternative laser cutting materials such as specialty paper, linoleum, rubber, etc. and also a small portion to pay for machine wear & tear / maintenance.

All students will be trained to use the prototyping equipment themselves with standard UCSC safety procedures. However, equipment will only be available to students while under the supervision of the instructor or TA during summer session 2. Future access will be determined by the DANM office / staff based on individual need and availability.

Objectives

The method of instruction will include lectures, demos, and video as well as in and out of class assignments. Class content will include exposure to relevant artists and designers working with prototyping technology, software demos, tutorials and advanced techniques, as well as an introduction to a variety of processes used in 2D & 3D prototyping. Homework assignments will include outside readings, software tutorials and project reflections.

The primary goal of this course will be for you to understand the concepts and practices of utilizing 2D & 3D software as tools of ideation for visualizing & prototyping conceptually driven works of art & design. A secondary goal of this class is to learn about past and contemporary artists, designers and makers who are creating and pushing the boundaries of how to utilize these systems in fine arts, design and interdisciplinary contexts.

Methodology

- Self Assessment
- Peer and small group work
- Discussion
- Supervised learning
- Verbal questioning
- Simulated or real skill tests

Requirements

Attendance is required as this class only meets for 5 weeks with twice the weekly workload, so missing one class is the equivalent to missing an entire week of class in a normal quarter schedule. Only medical or family emergencies will be accepted. Please contact the instructor before class, in either of these cases. **No exceptions.** In class participation during general discussions and especially during critiques, is required and is worth 10% of your grade.

In addition, students will be required to carry a sketchbook for concept designs and an external hard drive or pen drive for holding project files.

All projects and assignments will require students to work both inside and outside of class. Projects and assignments turned in late will be decreased by 1/4 points for each day the assignment is late. Example: 20 points will equal 15 after 1 day. 20 points will be 10 points after 2 days late.

Assessment

Evaluation will be based on the following:

1. The quality of your class participation, including contribution to critiques, discussions and in class presentations.
2. The quality of your completed assignments, including:
 - a. Your comprehension of concepts.
 - b. Demonstration of your effort in achieving your goals.
 - c. The exploration of new ideas.
 - d. Research into an inspiring or empowering subject.
 - e. Your individual personal development.
3. The completion of a final project to be determined in the 2nd and 3rd weeks of class.

Assessment Items

TUTORIAL 1: From digital to physical (laser cutting, vacuforming and mold making) = 10%
Week 1

PROJECT 1: Group project (mini golf obstacles) = 30%
Due Week 3

PROJECT 2: Final individual project = 35%
Due Week 5

Final notes/sketchbook diary = 15%
Due Week 5

Attendance and participation = 10%

TOTAL = 100%

Equipment and Resources



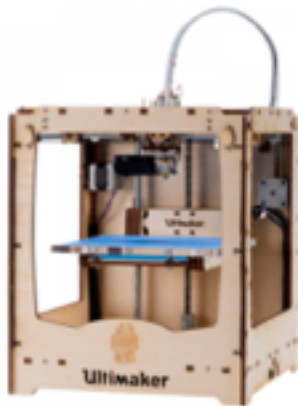
MAKERBOT THING-O-MATIC

<http://www.makerbot.com/docs/thingomatic>

located in the Prototyping Lab (DARC 225)

Software needed to print: **Replicator G**

<http://replicat.org/>



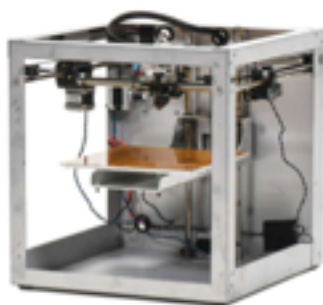
ULTIMAKER

located in the Prototyping Lab (DARC 225)

<https://ultimaker.com/en/support/ultimaker-printers/ultimaker-original>

Software needed to print: **Netfab studio**

<http://www.netfabb.com/downloadcenter.php?basic=1>



SOLIDOODLE

located in the Prototyping Lab (DARC 225)

<http://www.solidoodle.com/workbench-apprentice>

Software needed to print: **Soliprint**

<http://support.solidoodle.com/hc/en-us/articles/204155250-SoliPrint-Installation-Files>



MAKERBOT REPLICATOR 5th Generation

located in the Prototyping Lab (DARC 225)

<http://store.makerbot.com/replicator>

Software needed to print: **Makerbot Desktop**
<http://www.makerbot.com/desktop>



FORMECH VACUFORM

Located in the Prototyping LAB (DARC 225)



EPILOG LEGEND 36EXT Laser Cutter

Located in the DARC Gradlab (first floor of the DARC building)

www.epiloglaser.com

Applications

Autodesk Free software:

123D Design, 123D Make, Meshmixer + more

<http://www.123dapp.com/create>

Sculptris

<http://pixologic.com/sculptris/>

Adobe Illustrator (30 day trial)

<http://www.adobe.com/products/illustrator.html>

inkscape (Free Vector program like Adobe Illustrator)

<https://inkscape.org/en/>

Corel Draw

<http://www.coreldraw.com/us/product/graphic-design-software/>

Adobe Photoshop (30 day trial)

<http://www.adobe.com/products/photoshop.html>

Gimp (Free Raster program like Adobe Photoshop)

<http://www.gimp.org/>

Laser cutting tutorials

Silkscreening

<http://www.instructables.com/id/Photo-Screen-Printing-without-Emulsion-laser-etch/>

Silkscreen 2

<http://www.instructables.com/id/From-artwork-to-completed-silkscreen-in-15-minutes/?ALLSTEPS>

Lasercut linoleum stamps

http://wiki.fablab.is/wiki/Lasercut_linoleum_stamps

Woodblock printing

<http://www.instructables.com/id/Woodblock-printing-with-the-laser-cutter/?ALLSTEPS>

Laser cut stencils

<http://www.instructables.com/id/Laser-Cut-Stencil-Letters/?ALLSTEPS>

Rubber stamps

<https://learn.adafruit.com/laser-custom-stamps>

Easy box creator

<http://www.makercase.com>

3D Printing Software tutorials

123D Design

<http://www.123dapp.com/howto/design>

123D MAKE

<https://www.youtube.com/watch?v=JImOkZFOxAQ>

Sculptris tutorial:

<https://www.youtube.com/watch?v=6K-U5AlaGwc>

<https://www.youtube.com/watch?v=U9Dxi5fCd0Q>

Makerbot:

<https://www.youtube.com/watch?v=YZoaHR7NdQU>

<https://www.youtube.com/watch?v=PQWyVsHcVfY>

Meshmixer:

[https://www.youtube.com/watch?](https://www.youtube.com/watch?v=OICjuIIVDuw&list=PLu8TYSQ5jCFjdQBHsLoybhdKXOTmpTRlb)

[v=OICjuIIVDuw&list=PLu8TYSQ5jCFjdQBHsLoybhdKXOTmpTRlb](https://www.youtube.com/watch?v=OICjuIIVDuw&list=PLu8TYSQ5jCFjdQBHsLoybhdKXOTmpTRlb)

Fusion 360

[https://www.youtube.com/watch?](https://www.youtube.com/watch?v=UyhfrZYYQLs&list=PLmA_xUT-8UIJpYbha60oAQMxFIBY371oZ)

[v=UyhfrZYYQLs&list=PLmA_xUT-8UIJpYbha60oAQMxFIBY371oZ](https://www.youtube.com/watch?v=UyhfrZYYQLs&list=PLmA_xUT-8UIJpYbha60oAQMxFIBY371oZ)

Inkscape

[https://www.youtube.com/watch?](https://www.youtube.com/watch?v=zUIOEXssTSE&list=PLGLfVvz_LVvTSi9bKrvGR2_DBg0Tv8Dxo)

[v=zUIOEXssTSE&list=PLGLfVvz_LVvTSi9bKrvGR2_DBg0Tv8Dxo](https://www.youtube.com/watch?v=zUIOEXssTSE&list=PLGLfVvz_LVvTSi9bKrvGR2_DBg0Tv8Dxo)