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)

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)

**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**

**Lasercut linoleum stamps**
http://wiki.fablab.is/wiki/Lasercut_linoleum_stamps

**Woodblock printing**

**Laser cut stencils**

**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-U5AiaGwc
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?v=OlCjuiLVDuw&list=PLu8TYSQ5jCFjdQBHsLoybhdKXOTmpTRlb

Fusion 360
https://www.youtube.com/watch?v=UyhfrZYYQLs&list=PLmA_xUT-8UJpYbha60oAQMxFIIBY371oZ

Inkscape
https://www.youtube.com/watch?v=zUIQEXssTSE&list=PLGLfVvz_LVvTSi9bKrvGR2_DBg0Tv8Dxo