USC Iovine and Young Academy
Arts, Technology and the Business of Innovation

ACAD 187: Digital Toolbox: 3D Design

Units: 2
Day-Time: TR 12:00pm - 1:50pm
Location: SKS 404
Instructor: Aaron Siegel

Office: Stonier 331
Office Hours: TR 11:00am - 12:00pm, 2:00pm - 3:00pm
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Website: www.datadreamer.com/usc/acad187

IT Help: http://iovine-young.usc.edu/ait/index.html
Hours of Service: M-F, 8:30am - 5:30pm
Contact Info: iyhelp@usc.edu, 213-821-6140

Catalogue Description:
An eight-week course covering the basics of industry-standard 3D modeling, rendering, and capturing software used for product, packaging, industrial and environmental design. Open only to Arts, Technology and the Business of Innovation majors.

Pre-requisites:
None

Course Description:
3D Digital Tools for Design will teach students 3D modeling, rendering, digital capture and physical output of 3D objects for product, packaging and environmental design. This class will focus on elemental skills, concepts, and problem solving methods in these programs and challenge students to apply these building blocks creatively in a variety of increasingly sophisticated and innovative design solutions. Software instruction will include Maya, Unity3D, and the Three.js WebGL javascript library, and output methods will include rendered images and interactive software experiences.

Learning Objectives:
1. Fundamental understanding of working with 3D modeling software.
2. Experimentation with concepts related to product design and construction.
3. Proficiency in output of 3D rendered imagery and 3D modeled assets.

Specific Topics to be Covered:
- Techniques for 3D modeling, texturing, lighting, and rendering.
- Preparing and exporting 3D models to be used in other software applications.
- Concepts related to the history of spatial art and product design.

Technological Proficiency and Hardware/Software Required:
- Laptop computer with authorized installations of the following software:
  - Autodesk Maya 2018.
  - Adobe Photoshop CC 2018.
  - Unity3D 2018.
  - SublimeText, Atom, Brackets, or the code editor of your choice.
- Digital camera (smartphone is fine).
- Three-button mouse (highly recommended).

Required Readings and Supplementary Materials:

- Autodesk Maya Support Documents and Online Tutorials.
- Unity3D tutorials.
- Lynda.com tutorials for Maya.

Assignments:

1. Hard-surface Model. (15%)
    - Craft a specific type of object using only the simple polygonal modeling tools provided in Maya. Using boolean combinations to add or subtract areas of the model as well as grouping pieces together. Produce a basic rendering at 1920 x 1080. Submit your Maya scene as well as the rendering.
2. Organic Model. (15%)
    - Craft a specific type of object using the soft modeling tools provided in Maya such as meshes and NURBS. The object should have smooth qualities, taking advantage of the mesh tools. Produce a basic rendering at 1920 x 1080. Submit your Maya scene as well as the rendering.
3. Scene Rendering. (25%)
    - Invent a new product. It can be fictional or an improved version of something that currently exists. Apply materials and lighting to your object to make it as photo realistic as possible. Play with textures, coloring, and the effect of lighting on the various types of materials. Use Adobe Photoshop to create or modify materials for use on your models. Set up a number of cameras in your scene in order to render multiple vantage points. Use the Arnold renderer and render your images at 3840 x 2160.
4. Interactive Project. (25%)
    - Create a model and export it for use in Unity3D or a WebGL application using Three.js. Setup a simple environment with multiple light sources that allows the viewer to move their view around using the mouse and keyboard. Your model should utilize materials and textures that were applied in Maya.

Grading Breakdown:			**Grading Scale:**		
Project #1: Hard-surface Model.	15%			A = 100 - 93	A- = 92 - 90
Project #2: Organic Model.	15%		B+ = 89 - 87	B = 86 - 83	B- = 82 - 80
Project #3: Scene Rendering.	25%		C+ = 79 - 77	C = 76 - 73	C- = 72 - 70
Project #4: Interactive Project.	25%		D+ = 69 - 67	D = 66 - 63	D- = 62 - 60
Checkpoints (4)	20%		F = 59 and below		

Weekly Class Schedule:

Week	**Day 1**	**Day 2**
1	Introduction / Syllabus / Schedule. Maya Interface / Viewports. Objects / Polygons.	Checkpoint #1: Find object images. Scenes / Object Groups. Polygonal Modeling.
2	Object duplication, instancing. Booleans and complex attachments. Vertices / Edges / Faces / Objects. Basic rendering.	DUE: Project #1: Hard-surface Model.

3	Sculpting Meshes. Select / Transform / Symmetry Options. Edge loops.	Checkpoint #2: Find object images. Smoothing. Creases. Deformation Tools.
4	NURBS Curves / NURBS Surfaces. Revolve / Loft / Planar. Isoparms.	DUE: Project #2: Organic Model.
5	Materials. Textures. Hypershade.	Checkpoint #3: Idea illustrations. Lights / Cameras.
6	Arnold Renderer / Materials / Lights.	DUE: Project #3: Scene Rendering.
7	Exporting models. Unity3D introduction.	Checkpoint #4: Plan Scene. WebGL Three.js introduction.
8	WORK DAY!	DUE: Project #4: Interactive Project.

Academic Conduct:
Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, "Behavior Violating University Standards" https://policy.usc.edu/student/scampus/part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct.

Discrimination, sexual assault, intimate partner violence, stalking, and harassment are prohibited by the university. You are encouraged to report all incidents to the *Office of Equity and Diversity/Title IX Office* http://equity.usc.edu and/or to the *Department of Public Safety* http://dps.usc.edu. This is important for the health and safety of the whole USC community. Faculty and staff must report any information regarding an incident to the Title IX Coordinator who will provide outreach and information to the affected party. The sexual assault resource center webpage http://sarc.usc.edu fully describes reporting options. Relationship and Sexual Violence Services https://engemannshc.usc.edu/rsvp provides 24/7 confidential support.

Support Systems:
A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://ali.usc.edu, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://dsp.usc.edu provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of Blackboard, teleconferencing, and other technology.

Emergency Preparedness/Course Continuity in a Crisis:
If an officially-declared emergency makes travel to campus infeasible, USC Emergency Information http://emergency.usc.edu will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.