# IML 354
# Introduction to 3D Modeling

Spring 2019
2 units
Location: SCI L104
Time: Mon, 3:00 to 4:50 pm
Prerequisites: None Recommended

Instructor: Silvia Rigon
Email: rigon@usc.edu
Office Hours: Mon, 1:00 to 3:00 pm
SA: Ethan Bresnick
Email: ebresnic@usc.edu

## COURSE DESCRIPTION

This course introduces students to the history and theory of spatial representation and conveys foundational authoring skills in modeling and interactive 3D spaces. 3D modeling is the basis for many forms of image creation with digital media, be it for the construction of virtual architectures, environments, animation or game asset creation. Understanding and mastering techniques of 3D representation with the computer provide students with foundational knowledge not only to create their own computer-graphics models but also to move on to advanced techniques in computer-aided fabrication such as 3D printing.

Building on an introduction that covers the historical role of spatial representation we examine how techniques such as linear perspective impact our perception of the world around us and how they relate to large conceptual shifts in culture, society and art. Through a combination of primary texts such as Leon Battista Alberti's first treatise on linear perspective and Guy Debord's *Theory of the Dérive*, the course explores the cultural context of spatial representation and in parallel gives a practical hands-on introduction to modeling techniques.

The exercises, readings, discussions and assignments in this class are designed to support two primary goals: 1.) Convey knowledge about spatial representation and its cultural implications;
2.) Develop foundational authoring skills in 3D modeling and animation with programs like Autodesk Maya and Unity3D. This course is the first in a sequence of courses introducing 3D authoring skills and provides the scaffolding to more advanced creative uses of 3D.

## LEARNING OBJECTIVES

At the end of the course, a student should be able to:

1. Identify essential elements, techniques and learning resources of 3D modeling, 3D animation, and 3D interactive simulations utilized across different media art and design genres.

2. Develop a personal aesthetic demonstrating imaginative and independent solutions with authoring skills in 3D modeling and animation with programs like Autodesk Maya and Unity3D
3. Demonstrate an understanding of cultural contexts and implications of concepts of spatial representation.

**COURSE STRUCTURE**

The course is conceived as a studio class in which students get a practical hands-on introduction to multiple approaches of 3D modeling. Over the course of the semester students will complete four projects conceived to foster an iterative understanding of the representation of space with linear perspective, 3D modeling and the integration of 3-dimensional creations into interactive environments. The course will be held in a computer lab with all necessary software tools installed on lab computers. Students are expected to post responses to the assigned readings on the class wiki. Readings will provide the conceptual foundations for practical instruction.

**ASSIGNMENTS**

| | |
|---|---|
| · **Assignment #1** | 15% |
| · **Assignment #2** | 20% |
| · **Assignment #3** | 15% |
| · **Assignment #4** | 20% |
| · **Reading Response** | 20% |
| · **Participation in Class Discussion** | 10% |

**Assignment #1: Understanding Space, 15%**
(Complete assignment and 100 word reflection *due Week 5, February 6th, 2019*)
Choose an original object you have invented and model it in Maya. Export four screenshots in four views including top, side, front and perspective.

(50% milestone *due Week 3, January 23rd 2019*)
Upload 5 pencil sketches of original objects you have designed to the Wiki.

**Assignment #2: Architectural Space, 20%**
(Complete assignment and 100 word reflection *due Week 7, February 20th, 2019*)
Create a static architectural scene in Maya populated with objects. You need to be the original creator of each element in the scene. The use of found models are not permitted. Use lighting, materials and composition to help tell a story and produce at least six static renders using Arnold that explore different points of view. Make your renders 1280HD.

(50% milestone *due Week 6, February 13th, 2019*)
Upload six test screenshots of your scene with completed models and/or placeholders. Materials and Lighting are not required for the 50% milestone.

**Assignment #3: Temporal Space, 15%**
(Complete assignment and 100 word reflection *due Week 11, March 27th, 2019*)

Build on the scene produced for Assignment #2 to create a looping animation between 15 and 30 seconds long. You can use the same set-up you had in the previous assignment or add new elements to the scene. Experiment with both camera and object animation. Make your animation 1280HD.

(50% milestone *due Week 9, March 6, 2019*)
Create a low-quality preview of your animation as well as four 1280x720 still-image test renders from key moments in the animation.

**Assignment #4: Interactive Space, 20%**
(Complete assignment *due Week 15, April 24, 2019*)
Use Unity3D to build a scene that can be explored interactively in a first person perspective. Explore terrain creation with the tools within Unity3D and import Maya models to populate the scene. Design a characteristic atmosphere for your scene using techniques such as lighting and color. The deliverable for this assignment is a compiled Mac application. The use of all found assets must be clearly listed.

(50% milestone *due Week 13, April 10, 2019*)
Unity scene complete with Maya models and/or animation and first-person controller navigation.

All assignments and assignment 50% milestones have to be posted to the course wiki before class starts. The final assignment posts has to contain the assigned images, links to animations or applications along with a short process description (100 words) explaining the process of conceiving, planning and making the assignment.

**ATTENDANCE:**

Attendance is mandatory. Absences require instructor notification and permission. Absences caused by emergency or illness are excusable with verification (e.g. a doctor's note). If a student is more than 15 minutes late they will be marked as having an unexcused absence. Two unexcused absences will result in one full grade letter down (A+ to B+).

**EVALUATION**

Part of the objective of the class is to help students develop an iterative approach to 3D-modeling, therefore late assignments will adversely affect your grade. The only acceptable excuses for missing an assignment deadline are illness or emergency. Students must inform instructor before due date with evidence in order for an extension to be granted. For assignments turned in after the deadline without prior permission from the instructor, a penalty will be imposed equal to 10% of the total available points for the assignment, for each day or part of a day that the assignment is late, up to a maximum of seven days. Late assignments will not receive feedback.

Each project will be graded on its aesthetic, conceptual and technical achievement, innovation and risk taking, as well as overall effort. The class encourages students to use each other as valuable resources for learning and feedback, therefore active engagement and participation in class will also contribute towards the final grade.

Each assignment will be graded according to the following guidelines.

| | |
|---|---|
| **50% Milestone** | **2/10** |
| **Completion** | **2/10** |
| **Technique** | **2/10** |
| **Concept** | **2/10** |
| **Ambition** | **2/10** |
| **Total** | **10/10** |

**Grading Table:**

| | |
|---|---|
| **A (95-100)**<br><br>**A- (90-94)** | Demonstrates a high degree of creative and critical thinking — a superior ability to organize, to analyze, and to integrate concepts and techniques with a very high degree of skill in their application. There is evidence of substantial research and thoughtful engagement with the course material; all work is properly sourced and cited. Structural and formal elements of the work reinforce the conceptual core in productive ways, design decisions are controlled and defensible, and work is uncompromised by technical problems. Projects show evidence of development based on feedback given during workshop sessions. All coursework meets submission guidelines and due dates. |
| **B+ (87-89)**<br><br>**B (83-86)**<br><br>**B- (80-82)** | Demonstrates an above average degree of creative and critical thinking — an ability to organize, to analyze, and to integrate concepts and techniques with skill in their application. There is evidence of solid research and engagement with course materials; all work is properly sourced and cited. Structural and formal elements of the work align with its conceptual core, design decisions are defensible, and work is generally uncompromised by technical problems. Projects show evidence of development based on feedback given during workshop sessions. Coursework meets submission guidelines and due dates. |

| | |
|---|---|
| **C+ (77-79)**<br><br>**C (73-76)**<br><br>**C- (70-72)** | Demonstrates some degree of creative and critical thinking — a satisfactory ability to integrate concepts and techniques. There is some evidence of research and engagement with course materials; all work is generally sourced and cited correctly. Structural and formal elements of the work are not fully aligned with its conceptual core, and work is generally uncompromised by technical problems. Projects show minimal evidence of development based on feedback given during workshop sessions. Coursework generally meets submission guidelines and due dates.<br><br>***C- grade does not meet the minimum passing quality for undergraduate credit** (except in courses designated by a school or department to have a higher minimum standard for passing).<br>See University Catalogue under individual program requirements. |

**Statement on Fair Use**: Fair use is a legal principle that defines certain limitations on the exclusive rights of copyright holders. MA+P projects are produced with fair use doctrines in mind using its four pillars: (1) the purpose and character of use, (2) the nature of the copyrighted work, (3) the amount and substantiality of the portion used in relation to the copyrighted work as a whole, and (4) the effect of the use upon the potential market for or value of the copyrighted work. Generally speaking, this means you must only use as much of a copyrighted work as is necessary to make your point, and you must cite your sources accordingly.

**Citation Guidelines:** We assert that work produced in our classes is covered under the Doctrine of Fair Use. In order to make this claim, however, all projects must include academically appropriate citations in the form of a References section, which covers all sources, in order to receive a passing grade. The References section is either included in the project itself or as a separate document, as appropriate. We follow the Kairos Journal of Rhetoric, Technology and Pedagogy style guide <http://kairos.technorhetoric.net/styleguide.html> for citation purposes; Kairos uses a modified APA format, whose general guidelines and specific examples may be found here: <http://kairos.technorhetoric.net/styleguide.html#apa>

**Computer code** is often shared and reused. This is appropriate in a MA+P course unless otherwise directed by the assignment. If you do use code, you should attribute it. Please follow these protocols from MIT which call for placing a comment in one's code with a URL to the original source, a note if it was adapted, and the date of retrieval: <https://integrity.mit.edu/handbook/writing-code>

**GPA Notes**
4.0 A and above
3.0 B and above
2.0 C and above

**READINGS**

1. Leon Battista Alberti: On Painting, Book 1 (Due Week 3)
2. Anthony di Mari, Nora Yoo, Operative Design: A Catalogue of Spatial Verbs (Due Week 4)
3. Herve Descottes, Celia E. Ramos, Architectural Lighting: Designing with Light and Space (Due Week 5)
4. Hito Steyerl, In Free Fall: A Thought Experiment on Vertical Perspective (Due Week 6)
5. Scott McCloud: Time Frame (Due Week 8)
6. Guy Debord: Theory of the derive (Due Week 9)
7. Brian Massumi: Strange Horizon. Buildings, Biograms and the Body Topologic (Due Week 12)
8. Matthew Frederick, 101 Things I Learned in Architecture School (Due Week 14)

**READING RESPONSES**

Option 1:
Post one screenshot or render of a Maya model or scene that responds to a given reading. Be prepared to discuss why your response is relevant to the reading and how it utilizes new skills. Please limit the time you spend on the response to under 30 minutes.
Option 2:
Post a 200 word written response to the reading.
Option 3:
Make a drawing with details that responds to a give reading. Be prepared to discuss why your response is relevant to the reading and how it visualize new skills. Please limit the time you spend on the response to under 1 hour. Post a screenshot or scan and bring the drawing to class.

**WEEKLY SCHEDULE**

The following weekly schedule is subject to change. Please consult the course wiki for the most current information, assignments and due dates.

**Week 1**
Jan 9, 2019

Introduction and Course Overview
**Introducing Assignment #1: Understanding Space**
Brainstorming Techniques

*Lynda Tutorials:*
Maya 2018 Essential Training
1. The Maya Interface
2. Select and Manipulate Objects
3. Organize Maya Scenes
4. Create Polygonal Meshes
5. Model Polygonal Meshes
6. Refine Polygonal Meshes

**Week 2**
Jan 16, 2019

3D Modeling Strategies from Contemporary Sculpture

Perspective
Introduction to Maya
Maya Workshop #1: Project setup, interface, selection, manipulation
Class Exercise: Construct a simple scene in Maya

*Reading for next week:*
Leon Battista Alberti: On Painting, Book 1

*Lynda Tutorials:*
Maya 2018 Essential Training
7. NURBS Modeling Technique
8. Refine NURBS Models

**Week 3**
Jan 23, 2019

**Assignment #1 50% Milestone Due**
Maya Workshop #2: NURBS Modeling Technique

*Reading Responses due:*
Leon Battista Alberti: On Painting, Book 1

*Reading for next week:*
Anthony di Mari, Nora Yoo, Operative Design: A Catalogue of Spatial Verbs

*Lynda Tutorials:*
Maya 2018 Essential Training
9. Create Materials
10. Apply Materials and Textures

**Week 4**
Jan 30, 2019

Maya Workshop #2: Polygonal modeling from reference
Maya Workshop #3: Basic character modeling

*Reading Responses due:*
Anthony di Mari, Nora Yoo, Operative Design: A Catalogue of Spatial Verbs

*Reading for next week:*
Geoff Manaugh, Architectural Conjecture, Urban Speculation

*Lynda Tutorials:*
Maya: Rendering with Arnold 5
1. Concepts
2. Studio Lighting
3. Natural and Environmental Lighting

**Week 5**
Feb 6, 2019

**Assignment #1 due**
Lighting concepts
Maya Workshop #5: Lighting and Rendering in Maya and Arnold

**Introduction - Assignment #2: Architectural Space**

*Reading for next week:*
Herve Descottes, Celia E. Ramos, Architectural Lighting: Designing with Light and Space

Lynda Tutorial:
Maya: Rendering with Arnold 5
4. Materials and Mapping
5. Rendering

**Week 6**
Feb 13, 2019

Maya Workshop #4: Materials and Textures using Maya and Arnold
**Assignment #2 50% Milestone Due**

**Week 7**
Feb 20, 2019

**Assignment #2 Due**
Presentation and peer review

*Reading Responses due:*
Herve Descottes, Celia E. Ramos, Architectural Lighting: Designing with Light and Space

*Reading for next week:*
Hito Steyerl, In Free Fall: A Thought Experiment on Vertical Perspective

*Lynda Tutorials:*
Maya 2018 Essential Training
13. Animate in Maya

**Week 8**
Feb 27, 2019

**Introduction - Assignment # 3: Temporal Space**
Maya Workshop #6: Camera, Object and Path Animation

*Reading Responses due:*
Hito Steyerl, In Free Fall: A Thought Experiment on Vertical Perspective

*Reading for next week:*
Guy Debord, Theory of the dérive

**Week 9**
Mar 6, 2019

Maya Workshop #7: MASH Network Animation
**Assignment #3 50% Milestone Due**

*Reading Responses due:*
Guy Debord: Theory of the dérive

**SPRING BREAK**

**Week 10**
Mar 20, 2019
Work on Assignment #3

**Week 11**
Mar 27, 2019
**Assignment #3 due**
In-class presentation, peer review

*Reading for next week:*
Brian Massumi, Strange Horizon. Buildings, Biograms and the Body Topologic

*Lynda Tutorials:*
Unity 3D Essential Training
1. Setting Up the Unity Project
2. Understanding the Unity Interface
3. Working with Assets

**Week 12**
Apr 3, 2019

**Introduction - Assignment #4: Interactive Space**
Designing a Space for Exploration
Unity3D Workshop #1: Project Setup, Importing Maya Models, Terrain, Materials & Collision

*Reading Responses due:*
Brian Massumi: Strange Horizon. Buildings, Biograms and the Body Topologic

*Lynda Tutorials:*
Unity 3D Essential Training

4. Applying Materials
5. Prefabs
6. Level Building
7. Creating and Implementing Animation

**Week 13**
Apr 10, 2019

Unity3D Workshop #2: Animation, Lighting, Particle System, Audio & Rigid Body
**-Assignment #4: 50% Milestone Due**

*Reading for next week:*
Matthew Frederick, 101 Things I Learned in Architecture School

*Lynda Tutorials:*
Unity 3D Essential Training
8. Collisions
9. Adding Audio
10. Unity Lighting
11. Baking Lighting

**Week 14**
Apr 17, 2019

Work on Assignment #4

*Reading Responses due:*
Matthew Frederick, 101 Things I Learned in Architecture School

*Lynda Tutorials:*
Unity 3D Essential Training
12. Particle and FX in Unity
13. Post-Processing
14. Timeline: Creating Cinematics
15. Packing Your Unity Project

**Week 15**
Apr 24, 2019

**- Assignment #4 due**
In-class presentation, peer review
Class round-up

**Exam**
May 1, 2019
- **100 word response for Assignment #4 due**

**Statement on Academic Conduct and Support Systems**

**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/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.

**Support Systems:**
*Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call*
Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention. https://engemannshc.usc.edu/counseling/

*National Suicide Prevention Lifeline - 1-800-273-8255*
Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. http://www.suicidepreventionlifeline.org

*Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call*
Free and confidential therapy services, workshops, and training for situations related to gender-based harm. https://engemannshc.usc.edu/rsvp/

*Sexual Assault Resource Center*
For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: http://sarc.usc.edu/

*Office of Equity and Diversity (OED)/Title IX Compliance – (213) 740-5086*
Works with faculty, staff, visitors, applicants, and students around issues of protected class. https://equity.usc.edu/

*Bias Assessment Response and Support*
Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. https://studentaffairs.usc.edu/bias-assessment-response-support/

*The Office of Disability Services and Programs*
Provides certification for students with disabilities and helps arrange relevant accommodations. http://dsp.usc.edu

*Student Support and Advocacy – (213) 821-4710*
Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. https://studentaffairs.usc.edu/ssa/

*Diversity at USC*
Information on events, programs and training, the Diversity Task Force (including representatives for each school), chronology, participation, and various resources for students. https://diversity.usc.edu/

*USC Emergency Information*

Provides safety and other updates, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible, http://emergency.usc.edu

*USC Department of Public Safety – 213-740-4321 (UPC) and 323-442-1000 (HSC) for 24-hour emergency assistance or to report a crime.*
Provides overall safety to USC community. http://dps.usc.edu

**PLEASE NOTE:**
**FOOD AND DRINKS (OTHER THAN WATER) ARE NOT PERMITTED IN ANY INSTRUCTIONAL SPACES IN THE CINEMATIC ARTS COMPLEX**