USC School of Cinematic Arts
Institute for Multimedia Literacy

IML 354
Introduction to 3D Modeling

Spring 2017
2 units
Location: SCI L105
Time: Wednesdays, 4:00 to 5:50 pm

Prerequisites: None
Recommended Prep: None
Restrictions: Open to Media Arts and Practice (MAP) majors only.

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 virtual architectures, environments, animation or game asset creation. Understanding and mastering techniques of 3D representation with the computer provides 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 historic 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 scholarly texts such as Anne Friedberg's *The Virtual Window*, 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, ZBrush and Unity3D. The introduction to Unity3D will include a very basic introduction to the use of programming within the development environment of Unity. 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.

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 first three projects are individual assignments; the last project will be completed in small groups. 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. The responses will be guided through questions and small tasks that students need to address in their responses.

ASSIGNMENTS

- **Studio Assignments** 40%
- **Reading Responses** 20%
- **Midterm Exam** 30%
- **Participation in Class Discussions** 10%

Assignment #1: Understanding Space. Construct an image of an object of your choice with the methods of linear perspective. The assignment is carried out with pen and paper and serves to support an understanding of the foundations of perspective construction. You can select an object or scene of your choice and produce a depiction of it with the methods of linear perspective.

Assignment #2: Architectural Space. Create a static 3-dimensional scene in Maya populated with architectures and objects. Each element should be modeled in Maya using the techniques of polygon-based primitive modeling and mesh transformations. The scene should contain several elements so that a spatial staging of objects is achieved. Explore virtual lighting techniques to guide the eye through the scene. Once the scene is established produce at least six static renderings that use changing camera positions to explore differences in point of view, gradually pushing the perspective representation to its limits. In setting up these renderings think about image composition and how different settings of the virtual camera in Maya influence the spatial impression and the emotional impact of the scene.

Assignment #3: Temporal Space. Building on the scene produced for the first assignment use techniques of time-based animation to move objects in the scene and animate the camera to explore correlations between time and space. You can use the same set-up as you had in the previous assignment and animate objects you already modeled, or add new elements to the scene that are created with animation in mind. Besides object and basic character animation experiment with camera animation and the influences of both types of animation on one another. Design these animations such that the viewer experiences a dramatic unfolding of the scene. The deliverable of this assignment is a rendered film sequence of approx. 2 minutes length.

Assignment #4: Interactive Space. Using the real-time rendering program Unity3D build a 3-dimensional scene that can be explored interactively through a first person perspective. Explore the terrain creation with the tools within Unity and import Maya models to populate the scene. For the exploration of the scene use the First Person Controller set-up of Unity and combine the lessons learned from assignments 2 and 3 to design at least three different trajectories through the scene that offer a dramatic development of spatial exploration. Make use of the various lighting techniques within Unity to design a characteristic atmosphere for your scene. Understand the differences between real-time lighting in Unity and rendered lighting in Maya. The deliverable for this assignment is a compiled Unity-application containing your scene in a form that can be interactively explored. The in-class presentation will facilitate an exploration by several users.

All assignments have to be posted to the course wiki by the day they are due. The post has to contain the assigned images, movie-files or applications along with a short process description explaining the process of conceiving, planning and making the assignment.

EVALUATION

In general, you will be graded using these criteria:

Conceptual Core
- The project's controlling idea must be apparent.
- The project must be productively aligned with one or more multimedia genres.
- The project must effectively engage with the primary issue/s of the subject area into which it is intervening.

Research Component
- The project must display evidence of substantive research and thoughtful engagement with its subject matter.
- The project must use a variety of credible sources and cite them appropriately.
- The project ought to deploy more than one approach to an issue.

Form and Content
- The project's structural or formal elements must serve the conceptual core.
- The project's design decisions must be deliberate, controlled, and defensible.
- The project's efficacy must be unencumbered by technical problems.

Creative Realization
- The project must approach the subject in a creative or innovative manner.
- The project must use media and design principles effectively.
- The project must achieve significant goals that could not be realized on paper.

POLICIES

Fair Use
Fair use is a legal principle that defines certain limitations on the exclusive rights of copyright holders. The IML seeks to apply a reasonable working definition of fair use that will enable students and instructors to develop multimedia projects without seeking authorization for non-commercial, educational uses. In keeping with section 107 of the Copyright Act we recognize four factors that should be considered when determining whether a use is fair: (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. In general, we regard the reproduction of copyrighted works for the purposes of analysis or critique in this class to be covered by the principle of fair use.

Citation Guidelines
All projects will need to include academically appropriate citations in the form of a Works Cited section, which covers all sources, in order to receive a passing grade. The Works Cited is either included in the project or as a separate document, as appropriate to your project. The style we use is APA 5th edition and you may refer to these guidelines: http://owl.english.purdue.edu/owl/resource/560/01/

Statement on Academic Integrity
USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid using another's work as one's own. All students are expected to understand and abide by these principles. SCampus, the Student Guidebook, contains the Student Conduct Code in Section 11.00, while the recommended sanctions are located in Appendix

A: http://www.usc.edu/dept/publications/SCAMPUS/gov/. Students will be referred to the Office of Student Judicial Affairs and Community Standards for further review, should there be any suspicion of academic dishonesty. The Review process can be found at: http://www.usc.edu/student-affairs/SJACS/.

Statement for Students with Disabilities
Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday.

Emergency Plan
In the event that classes cannot convene at the university, all IML courses will continue via distance education. Specifically, the IML portal and course wikis will be deployed to enable faculty-student interaction (asynchronously and also via virtual office hours), complete syllabi, course readings and assignments, software tutorials, project assets, parameters and upload instructions, peer review processes and open source alternatives to professional-level software used in the IML curriculum. Further details are available on the course wiki.

Disruptive Student Behavior
Behavior that persistently or grossly interferes with classroom activities is considered disruptive behavior and may be subject to disciplinary action. Such behavior inhibits other students' ability to learn and an instructor's ability to teach. A student responsible for disruptive behavior may be required to leave class pending discussion and resolution of the problem and may be reported to the Office of Student Judicial Affairs for disciplinary action.

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
January 11, 2017
Introduction: Concepts of space and spatial representation
Course overview

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

Week 2
January 18, 2017
Tangible Space
Introduction to perspective construction and the Cartesian coordinate system; beginnings of computer graphics. Screening of relevant examples.
In class exercise: Reconstructing Albrecht Dürer's perspective

Reading for next week:
Anthony di Mari, *Operational Design* and A. di Mari, *Conditional Design* (excerpts)

Assignment #1: Construct linear perspective

Week 3
January 25, 2017

- Assignment #1 due
Introduction to Maya
Primitive modeling and shading concepts

Reading for next week:
Anne Friedberg, “The Multiple” from *The Virtual Window*

Week 4
February 1, 2017
Language of Shapes
Assignment #2: Create a static 3-dimensional scene
Modeling in Maya: Mesh editing
In-class exercise: build a sequence of shape variations

Reading for next week:
Urs Buttiker, *Louis Kahn - Light and Space* (excerpt)

Week 5
February 8, 2017
Light and Space
Discussion of lighting concepts, Light and Space Movement
Lighting in Maya

Week 6
February 15, 2017
- Assignment #2 due
Presentation and peer review

Week 7
February 22, 2017
Introduction to ZBrush

Reading for next week:
W.J.T. Mitchell and Mark B. N. Hansen, *Time and Space*

Week 8
March 1, 2017
Introduction to animation
Assignment # 3: Create animated scene

Week 9
March 8, 2017
Animation with Maya
Animated scene workshop

Spring Break

Week 10
March 22, 2017
- Assignment #3 due
In-class presentation, peer review

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

Week 11
March 29, 2017
Class excursion: Practicing the derive – analytical exploration of space

Reading for next week:
Sarah Kanouse, *Critical Day Trips: Tourism and Land-Based Practice*

Week 12
April 5, 2017
Space and Immersion
Introduction to Unity3D

Reading for next week:
Kevin Lynch, “The City Image and its Elements” in *The Image of the City*

Week 13
April 12, 2017
Designing a Space for Exploration
Discussion of spatial design concepts
Unity3D workshop

Week 14
April 19, 2017
Unity3D Workshop

Week 15
April 26, 2017
- Assignment #4 due
In-class presentations of final projects, peer review
Class round-up