

Anat-6750 Special Topic: 3D Animation for Medical Science

Course Director

Noah Leppek

Email: noah.leppek@ucdenver.edu Office Phone: 303-724-0513

Office hours: Drop by room N5209A, Bldg. 500 or schedule an appointment via email

Prerequisites

This course is offered to second year Master's students in the MSMHA program who have completed Anat-6205. Enrollment capped at 4 students by permission.

Location

Ed 1 room 1501

Credits and Workload

2 credit hours. 15 hours of lecture and 45 hours of lab

Course Description

This course teaches students to use Autodesk Maya to create professional animations illustrating concepts inherent in the study of anatomy and medical science. This is a project-based course.

Learning Management System

Dropbox and Canvas

Course Organization and Classroom Pedagogies

The core concepts involved in this course are modeling, texturing and animation. These three concepts will be reiterated over the course of three distinct modules. Class will meet twice a week, the first day will consist of 1 hour of didactic lecture followed by 1 hour of lab, the second day will consist of 2 hours of lab. Students will be expected to complete the tasks from the lecture during lab as homework, if the student finishes their homework before lab is over they may work on their Final project or their Capstone.

Module 1: Creation of a Surgical Tool

- Polygonal and NURBS modeling
- Basic materials and texture
- Basic animation techniques

Module 2: Animation of Macro Anatomy

- Model clean up
- Review textures
- Forward kinematics
- Inverse kinematics

Module 3: Creation of a Cellular Animation

- Review modeling
- Complex shaders
- Particle dynamics
- Field dynamics

Educational Goals and Learning Objectives

By the end of this course you should be able to create and modify geometric models, apply textures and material attributes to models, and animate models using a variety of animation techniques. Specific learning objectives will be provided for each class.

Student Responsibility

- Students will be expected to arrive on time. If you are late, please enter quietly to minimize disturbing other students, if you are more than 30 minutes late you will be counted as absent.
- Please silence cell phones and pagers, if you need to make an urgent call step outside of the classroom.
- Since this is a computer based class, absolutely no internet browsing. E-mails may be checked if need be during the break.
- The homework from the last lecture needs to be turned in by 10:00 AM before the next week's lecture begins.

Required Materials

A laptop and a three-button mouse ([example](#)) will be required for doing homework off-campus

Autodesk Maya 2016

Licenses will be provided

Minimum System Requirements

Operating Systems

- Microsoft Windows 7 (SP1), Windows 8 and Windows 8.1 Professional operating system
- Apple Mac OS X 10.8.5 and 10.9.x operating system

Hardware

- CPU 64-bit Intel or AMD multi-core processor
- RAM 4 GB of RAM (8GB recommended)
- Disk Space 4GB of free disk space for install

Recommended Reading

Maya Help Menu: Can be accessed through the program and [online](#)

Grading Policy

Attendance and completion of a class's homework is worth 6.5 percentage points resulting in 85 percent of the final grade, if the student does not complete the homework, 1 percentage point will be deducted each day after the due date from the

class grade. The final project will make up the remaining 15 percent.

Work	Individual Percentage	Combined Percentage
Lecture and Homework	6.5%	85%
Final Project	15%	15%

- Homework will be to reproduce the work described in the lecture and turned in via dropbox or canvas before the next week's class. At the beginning of the next week's lecture ten minutes will be provided to a randomly chosen student to present the homework assignment and a class discussion will take place. There will be no assignment for Class 1 so attending the lecture will count as full credit.
- Final project can be a part of the student's Capstone Project or a standalone project specifically for the class. The topic of the final should be decided upon by the student before Week 4 and confirmed by the Course Director. There will be no lecture for Week 14 to give students in-class time to work on the final project. Students will take turns presenting their projects during Class 15.
- The final project rubric is as follows: project must have some relevance to medical science and must include some kind of modeling, texturing, use of dynamics, be animated and rendered into a final quicklime movie. Project will be graded either pass or fail depending on if the student meets the criteria above. The project will not be graded according to subjective measures such as the artistic quality of the work. Projects will be presented to the class on May 9, time will be divided equally between the students for their presentations. Students will present their finished animations to the class and describe the processes they used to come to the final product, after which there will be a discussion period to ask questions and talk about the animation presented.

This course follows the MSMHA Grading policy and adheres to the following grade assignments:

Grade	Percentage
A	93-100
A-	90-92
B+	87-89
B	83-86
B-	80-82
C+	77-79
C	73-76
C-	70-72
D+	67-69
D	63-66
D-	60-62
F	<60

Make-Up Class Statement

If you foresee being unable to attend one of the scheduled classes due to major and

significant reasons, you must contact the Course Director as soon as possible prior to the class date. In the case of a severe illness, funeral of a family member, personal life event or unplanned catastrophic event (as defined by University rules), the Course Director can make accommodations so the lecture and homework assignment can be completed electronically.

Remediation Policy

In the event that a student completes the course but does not pass, remediation is not permitted by the Graduate School. However, the student will have the option to re-take the course (for the full course fee) the following semester in which the course is offered. The grade for both attempts to take the class will remain on the student's transcript.

Incomplete Policy

Incomplete grades are not granted for low academic performance. To be eligible for an incomplete grade, students must:

- Successfully complete a minimum of 75% of the course.
- Have special circumstances beyond their control that preclude them from attending class and completing graded assignments.
- Make arrangements to complete missing assignments with the original instructor. Verification of special circumstances is required.
- If the missing coursework is not completed within 1 year from the end of the semester in which the original course was scheduled, the "I" grade will convert to an "F" grade on your official transcript.

Withdrawal Policy

- After the add/drop date posted for the spring semester (February 5), enrolled students will receive a grade for the course. Discontinuing enrollment in a course after the add/drop date will result in a withdrawal, and a "W" grade will be posted on the student's transcript for that course.
- Withdrawal from ANAT Courses: The deadline for which a student may withdraw from a course is 4 weeks prior to the completion of the Spring Semester (April 22).
- To withdraw from a course, a student must first complete the Course Withdrawal Form. The Course Withdrawal Form must then be signed by the course instructor, the Executive Director, and the Assistant Dean of the Graduate School, Dr. Shawna McMahon. Please note that students are not eligible for a tuition refund after the add/drop period.

Code of Conduct Policy & Professionalism

Students are expected to abide by the Graduate School's Student Academic Honor & Conduct Code, as well as policies outlined in the MHA Student Handbook. Students are expected to act in a professional manner. Academic dishonesty, including cheating and sharing exam details will not be tolerated.

Conflict Resolution Statement

Good faith effort should always be made by students, faculty and administration to settle

all appeals, complaints and grievances on an informal basis. These efforts will include conferences between the persons directly involved and others who might help solve the problems. Formal conflict resolution policies are detailed in the policies and procedures of the University of Colorado Graduate School.

Disability Services Statement

- Students with documented disabilities should inform the Course Director as soon as possible to discuss and arrange for reasonable accommodations.
- The documentation requires a letter from the Office of Disability Resources and Services, specifically addressed to the course director, informing the specific accommodation (i.e. amount of extra testing time allowed, distraction-free environment, etc...)
- Students seeking a reasonable accommodation should be referred to Sherry Holden (sherry.holden@ucdenver.edu) or Selim Ozi (selim.oz@ucdenver.edu) to initiate the documentation process.

Weekly Schedule

Class will meet once per week on Tuesdays starting at 10:00 AM for a one hour lecture. Students will be expected to watch and take notes during this time. Class will then break for 10 minutes followed by an hour of lab time. Lab will reconvene on the following Thursday at 10:00AM for 2 hours.

Week #	Date	Title	Topics Covered	% of Grade
Week 1	Lecture/Lab 1/26	Introduction to the Interface	<ul style="list-style-type: none"> • Scene Navigation • Objects and Components • Selection Modes • Attributes • Basic Tools 	6.5 %
	Lab 1/28			
Week 2	Lecture/Lab 2/2	Basic Modeling	<ul style="list-style-type: none"> • Polygonal Modeling • Curves • NURBS Modeling 	6.5 %
	Lab 2/4			
Week 3	Lecture/Lab 2/9	Model Finishing	<ul style="list-style-type: none"> • Modeling Review • Tessellation • Normals 	6.5 %
	Lab 2/11			
Week 4	Lecture/Lab 2/16	Materials and Textures	<ul style="list-style-type: none"> • Materials Overview • Basic Textures • Lighting • Rendering 	6.5 %
	Lab 2/18			

Week 5	Lecture/Lab 2/23	Intro Animation	<ul style="list-style-type: none"> • Keyframe Animation • Timeline • Graph Editor • Playblast 	6.5 %
	Lab 2/25			
Week 6	Lecture/Lab 3/1	Anatomy Modeling	<ul style="list-style-type: none"> • Clean up Geometry • Sculpting Tool • Soft Select 	6.5 %
	Lab 3/3			
Week 7	Lecture/Lab 3/8	Inverse and Forward Kinematics	<ul style="list-style-type: none"> • Parent/Child Relationship • Group Hierarchies • IK Rigging • Constraints 	6.5 %
	Lab 3/10			
Week 8	Lecture 3/15	Inverse Kinematics Rigid Bind	<ul style="list-style-type: none"> • Rigid Binding • Edit Set Membership 	6.5 %
	Lab 3/17			
Spring Break Week (No Class)				
Week 9	Lecture/Lab 3/29	Inverse Kinematics Soft Bind	<ul style="list-style-type: none"> • Soft Binding • Influence Objects • Smooth Skin Weights 	6.5 %
	Lab 3/31			
Week 10	Lecture/Lab 3/5	Anatomy Animation	<ul style="list-style-type: none"> • Animating Bones • Keying Constraints • Controlling Deformations • Full Render 	6.5 %
	Lab 3/7			
Week 11	Lecture/Lab 4/12	Cell Modeling and Particle Dynamics	<ul style="list-style-type: none"> • nParticles • Emitters • Instance Geometry to Particles • Collisions 	6.5 %
	Lab 4/14			
Week 12	Lecture/Lab 4/19	Complex Shaders	<ul style="list-style-type: none"> • Translucency • Bump Mapping • Incandescence 	6.5 %
	Lab 4/21			
Capstone Week (No Class)				
Week 13	Lecture/Lab 5/3	Particle Animation	<ul style="list-style-type: none"> • Expressions • Camera Animation 	6.5 %

	Lab 5/5		<ul style="list-style-type: none"> • Lighting Animation • Full Render 	
Week 14	Lab 5/10	Final Project Work Session	<ul style="list-style-type: none"> • Work Period 	
	Lab 5/12			
Week 15	5/17	Final Project Presentation and Class Review		15%