Course Syllabus

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Art 445 3D Design

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Office Hours: Tues. 11-am-noon

This course focuses on the creation of virtual three dimensional form, space and motion, using the professional modeling and animation software Maya. The formal and conceptual issues that we will be wrestling with have inspired and bedeviled painters, sculptors, architects and designers for thousands of years. We will look at examples from nature, art history and the built environment for clues as to how to organize form, how to compose space, and how to choreograph motion.

There are two distinctly different ways for the artist to think about the worlds created within 3D software. The first is similar to how a painter or photographer might approach their subject. Forms are designed and arranged in space, with the goal always of a coherent two-dimensional composition from one point of view (the “picture plane”). The viewer is understood to be outside of the space looking into it. The other approach is akin to that of the sculptor or architect. Forms and spaces are designed to be coherent from all points of view. In this case, the viewer is understood to be moving through the three-dimensional environment. We’ll explore each of these ways of thinking about space and form throughout the semester.

Texts

Maya User manual **(http://help.autodesk.com/view/MAYAUL/2017/ENU//)**

Maya Learning Channel on YouTube ***(https://www.youtube.com/user/MayaHowTos/videos)***

The ***Lynda.com*** **(http://www.lynda.com/search?q=Blender)** stations in Gatewood 130 and Ferguson 251 also have complete Maya tutorials that are free for you to access.

Assignments

I will begin each assignment with an introduction, which will often include viewing relevant examples from historical and contemporary art and design. I will give a demo of any newly introduced technique, and students will use the remaining class time to work on their assignments.

Six hours per week is short for a studio design class, and we have a great deal of ground to cover over the course of the semester, so a significant amount of time will be required outside of class to complete each assignment. This will differ by assignment and student, but you should figure on spending at least 8 additional hours per week on the class (although final rendering times can take much, much longer than this. Like, days longer. Consider yourselves warned.) The department has

greatly increased student access to the digital labs on nights and weekends, so with a bit of time management, you should not have problems with access to equipment. The lab schedules will be posted outside this lab by the end of week one.

As prospective professionals in digital media arts, you need to become proficient at teaching yourselves new software. Although I will demo a great deal, and am always willing to answer questions, you should avail yourselves of all available resources to aid in your understanding of the technical aspects of the course.

On days when major assignments are due, we will discuss each student's final project in a class critique. This is an opportunity for students to get feedback from peers about how well a design works. Critiques are like exams, if you miss them without an approved excuse (see Attendance below) the grade for your assignment will be dropped by one full letter grade. This is true even if the project is in class, as we won't critique it without the designer present. For each additional class period a project is late, a further letter grade deduction will apply (e.g. due on Thursday, turned in following Thursday, a B project receives a D.)

Attendance

I take attendance at the start of each class. You will be permitted two unexcused absences (this includes absences for religious observances), after which your grade will be reduced by one step (e.g. B- to C+) for each additional absence. Absences will be considered excused if accompanied by a note from a doctor or health service, or a note on school letterhead from a coach, professor or administrator. Keep in mind that a steady stream of absences (excused or not) may affect the quality of your work, and so can have a negative impact on your final grade. Three unexcused latenesses or early departures will equal one absence.

Grading

Each assignment is to be presented on-time and complete. In a professional setting, good work is next to worthless after a deadline has passed, and you would never present half-finished work to a potential client or gallery. In addition, each project grade is based on one or more of the following factors:

- How well does the completed assignment answer the posed problem or illustrate the design principle?
- Did you thoroughly explore a number of different solutions before deciding on this as the best one? Many assignments will require a specific number of sketches or alternate approaches. Keep these as a discussion aid during critique of your final project.
- How far did you push the idea? The first and simplest answer is rarely the best, and is often a cliché. Really working at a problem from multiple angles often yields unexpected and original results.

There are 3 major projects, each of which is worth one third of your final grade. Included in the grade for each assignment are any sketches, models or presentations assigned for the project.

There is no discrete grade given for classroom participation in discussions and critiques (although critique attendance is mandatory.) Rather, the goal of critiques is to hone your ability to talk, think about and defend your own work; to begin to be able to analyze and judge your work in progress. The ultimate goal is for the designer to push him or herself, working through difficult passages and producing a final result that reflects the maximum amount of thought and effort.

Extra Credit and Make-up of Absences

No.

Clean-up and lab care

On the days when we are working in class, it is your responsibility to clean up your work area and leave the classroom as you found it. Remember that **no food or drink** will be allowed near the computers. You may stash water bottles or coffee at the front of the room.

You will also have to keep your digital desktops neat, which means saving any working files to an external drive. As UNCG students, you have unlimited storage through your box.uncg.edu account.

Academic Integrity Policy

Students are expected to abide by the UNCG Academic Integrity Policy for this class. (All out of class assignments are to be completed individually by the student unless otherwise directed by the instructor.)

UNCG seeks to comply fully with the Americans With Disabilities Act (ADA.) Students requesting accommodations based on disability must be registered with the Office of Disability Service located at 208 Elliot University Center. 336-334-5440 v/tty.

Semester Outline

Assignment 1 – Designed Space

Part A: Using sketches, diagrams and photographs, document the basic architecture of your living environment. Be sure to include all spaces and major elements (closets, shelves, hallways, windows, doors, etc.) Create a floorplan of the space (Illustrator is great for this) with good measurements (include interior wall dimensions and all built-ins/cabinets/closets, etc; basically, anything you intend to include in the model.) If you're in a very small dorm room or apartment, you should also consider including the entrance and hallways leading to your room as part of the model.

Part B: Employing and extending the modeling skills introduced in our first demos, create a model of your environment in Maya. This model should be as accurate as possible, but needn't be particularly detailed. Don't get hung up on furniture, carpeting or other non-integral elements. Keep both color and lighting simple.

Part C: Simultaneously with Part B, research one architect (from any place or time) who you will "commission" to redesign your living environment. Concentrate on the basic principles your architect uses to arrange interior and exterior space, to create visual impact and to guide movement. In a 10 minute presentation, discuss your architect's rationale for these principles (as found in writings by the architect and/or by critics/historians), show examples of their use in their existing work, and finally present your ideas in sketch and physical model form for the redesign of your living environment. Include one or more rendered stills of your Part B model in your presentation. Please prepare your presentation to be delivered via projection (Powerpoint, Preview slideshow, html, etc.) alongside physical models and sketches.

Part D: Create a model of your redesign in Maya. Again, concentrate on architectural form and space, rather than furnishings or small detail. Apply color and texture only as dictated by your architect's design principles (i.e. Frank Lloyd Wright's natural materials vs. Mies van der Rohe's steel and glass.) As your environment approaches completion, set the lighting. Do this carefully, the way you might adjust lights and darks in a drawing. The viewer's experience of the space will be influenced greatly by the way the forms come into and out of the lights. Finally, animate a camera to take the viewer into, through (and around, if appropriate) your environment. Present 3 large (approx. 1200 x 1000 pixels) JPG files and 1 small (320 x 240) QT video for the critique. NOTE: Rendering can take hours. You cannot render out a QT movie in the morning before class. You're liable to still be sitting there when we leave for the day. Give yourself enough time to render your project.

Assignment 2 – Character Modeling

Part A: Select a figure from the long history of painting or sculpture up to the end of the 20th Century. This may be a carved baboon from the Egyptian Middle Kingdom, an angel from a Renaissance painting of the Annunciation, a Buddhist temple guardian, or a nightmare vision conjured up by the Symbolists.

Part B: Create a set of drawings that clearly delineate the figure's design in the front view and the side view. The character should be in the "reference" pose. These drawings will be presented during an in-process critique and then will be imported into Maya as free Image Planes as visual guides for the next step. *Alternate Method:* Sculpt the character in actual clay (plastiline works best for this, but terra cotta is OK too if you can keep it from drying out). Capture clear digital images of front, rear and side views for use in Maya.

Part C: Using Maya's Polygon modeling and Sculpt tools, create a virtual model that captures the form of your design. Begin by creating a box-modeled base mesh that blocks out the major forms and planes of the figure. Carefully use the sculpt tools to create greater detail where needed, being sure to work around the model and to refer to the character design drawings.

Part D: Use Maya's Quad Draw retopology workflow to create a low polygon count version of your sculpted character. Follow the rules for good topology (all quads, relatively consistent size of polygons, reasonable edge flow) as you complete this version of the figure.

Part E: UV unwrap the figure and work in Maya and Photoshop to create appropriate Arnold materials and texture maps for it.

Part F: Light and render (using the Arnold Renderer) several hi-res (2048 x 2048 pix) stills of your finished character. Be sure to give yourself enough time to render your project.

Assignment 3 – Character and Motion

Part A: Create a 6 panel (minimum) set of storyboards that features your Assignment 2 character, moving about within its immediate environment, as determined by its art historical context. Try to develop a real personality for your character that expands on its original identity. Choreograph the character's movement based on this personality, with an eye towards creating a brief, intense and visually compelling performance. Part of your job in storyboarding will be blocking out camera angles. You should plan on multiple shots, such as long or medium distance as well as close-ups.

Part C: Build an animation rig for your character. Pay close attention to your storyboards, and how you're planning to move the character. Design your character's joints so that they articulate to allow for the desired movements.

Part D: At the same time that you are doing Part C, begin constructing the environment for your character. This background can be built entirely in 3D, or be made by compositing the character model with still or video footage of the actual area.

Part E: Animate your character. Using your storyboards as a guide, create the character's performance. Remember the principles of animation here (things like Squash and Stretch, Anticipation, Follow Through, etc.) while trying to capture the flavor of your storyboards. Do Playblasts and lo-res renders to check your progress. When you're satisfied, render out your final animation (you'll probably do a different render for each camera shot.)

Part D: Render each camera shot as a 960 x 540px Quicktime movie. Assemble the shots in Premiere or After Effects, add audio as desired, and render out a final QT movie file at 960 x 540px.

Calendar

8/15 Intro/Syllabus.
Demo: The Maya Interface (Workspaces, Menu sets, Panels, Shelves, Views, Marking Menus),
Objects and Transforms
Begin Assignment 1 Part A
View the following Youtube ***Getting Started*** **(https://www.youtube.com/playlist?list=PLD8E5717592CF5C26)** tutorials:

Maya Interface Tour ***(https://www.youtube.com/watch?v=p62UfGJRvRs&index=1&list=PLD8E5717592CF5C26)***

(https://www.youtube.com/watch?v=p62UfGJRvRs&index=1&list=PLD8E5717592CF5C26)

Navigating with Cameras **(https://www.youtube.com/watch?v=bvTLOvAWe6A&index=2&list=PLD8E5717592CF5C26)**

(https://www.youtube.com/watch?v=bvTLOvAWe6A&index=2&list=PLD8E5717592CF5C26)

Creating Primitive Objects **(https://www.youtube.com/watch?v=Q54XbeGspD4&index=3&list=PLD8E5717592CF5C26)**

(https://www.youtube.com/watch?v=Q54XbeGspD4&index=3&list=PLD8E5717592CF5C26)

Moving Objects ***(https://www.youtube.com/watch?v=1n89UOtMI_Y&list=PLD8E5717592CF5C26&index=4)***

(https://www.youtube.com/watch?v=1n89UOtMI_Y&list=PLD8E5717592CF5C26&index=4)

Rotating Objects ***(https://www.youtube.com/watch?v=BvsN5GzxoHo&index=5&list=PLD8E5717592CF5C26)***

(https://www.youtube.com/watch?v=BvsN5GzxoHo&index=5&list=PLD8E5717592CF5C26)

Scaling Objects **(https://www.youtube.com/watch?v=Kmuf2M9Nvp0&list=PLD8E5717592CF5C26&index=6)**

(https://www.youtube.com/watch?v=Kmuf2M9Nvp0&list=PLD8E5717592CF5C26&index=6)

Transforming with precision **(https://www.youtube.com/watch?v=okaC2_NxPYQ&list=PLD8E5717592CF5C26&index=7)**

(https://www.youtube.com/watch?v=okaC2_NxPYQ&list=PLD8E5717592CF5C26&index=7)

Selecting Objects (https://www.youtube.com/watch?v=2V7yz8Twi8Q&list=PLD8E5717592CF5C26&index=8)

(https://www.youtube.com/watch?v=2V7yz8Twi8Q&list=PLD8E5717592CF5C26&index=8)

8/17 Architecture discussion.
Demo: Setting up free Image Planes
Demo: Basic Polygon Modeling
Begin Assignment 1 Part B and research for presentation.
View the Youtube tutorial:

Maya Modeling Basics (https://www.youtube.com/watch?v=cdVBx1gpJwQ)

(https://www.youtube.com/watch?v=cdVBx1gpJwQ)

8/22 Demo: Physical Model Building.
Demo: Basic Polygon Mesh Modeling, Modeling Toolkit.
View the Youtube tutorials:

Use Maya Lights in Arnold (https://www.youtube.com/watch?v=GcDlYq8vGM8&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-&index=4)

(https://www.youtube.com/watch?v=GcDlYq8vGM8&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-&index=4)

Use Arnold area and mesh lights *(https://www.youtube.com/watch?v=qe0rD2sArvM&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-&index=5)*

(https://www.youtube.com/watch?v=qe0rD2sArvM&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-&index=5)

Create image-based lighting in Arnold (https://www.youtube.com/watch?v=YChyOryw1iM&index=6&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

(https://www.youtube.com/watch?v=YChyOryw1iM&index=6&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

Work with Arnold materials (https://www.youtube.com/watch?v=HWtH4n42ofM&index=2&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

(https://www.youtube.com/watch?v=HWtH4n42ofM&index=2&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

Render Settings in Arnold (https://www.youtube.com/watch?v=5BUveu3bFCg&index=1&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

(https://www.youtube.com/watch?v=5BUveu3bFCg&index=1&list=PLr9NWMMYHXf3vHku9oJ2mWStpuOdVoMo-)

8/24 Continue Part B in class.
Demo: Materials and render settings, basic lighting.

8/29 Labor Day Holiday

8/31 Continue Part B in class.
View the Youtube/Lynda.com tutorial:

How to Create UV Seams in Maya (https://www.youtube.com/watch?v=82Jc1EKLvHE)

(https://www.youtube.com/watch?v=82Jc1EKLvHE)

9/5 Architect's Redesign Presentations.
Demo: Basic UV unwrapping
Begin Assignment 1 Part D.
View the Youtube tutorials:

Maya 2017 - Texturing, Part 1 (https://www.youtube.com/watch?v=sSAvNPnqyCs)

(https://www.youtube.com/watch?v=sSAvNPnqyCs)

Maya 2017 - Texturing, Part 2 (https://www.youtube.com/watch?v=ljw9ZdJNnMU)

(https://www.youtube.com/watch?v=ljw9ZdJNnMU)

9/7 Demo: Texturing in Arnold. The Hypergraph.
Continue Assignment 1 Part D in class.
View the Youtube tutorial:

(https://www.youtube.com/watch?v=ZdiKmm1_gu4)

(https://www.youtube.com/watch?v=ZdiKmm1_gu4)

Overview of Constraints in Maya (https://www.youtube.com/watch?v=Vd3qzpFnBo0)

(https://www.youtube.com/watch?v=Vd3qzpFnBo0)

9/12 Demo; Constraints/Basic object animation.
Continue Assignment 1 Part D in class.
View the Youtube tutorial:

Camera Animation (https://www.youtube.com/watch?v=ZdiKmm1_gu4)

(https://www.youtube.com/watch?v=ZdiKmm1_gu4)

9/14 Demo: Camera animation
Work on Assign. 1 in class
Review Arnold rendering.

9/19 Work on Assign. 1 in class.
Clip assembly in Premiere

9/21 Work on Assign. 1 in class

9/26 **Critique Assignment 1.**
Introduce Assignment 2.
Character sheets due Tuesday.

9/28 Discussion of completed character sheets.
Demo: Principles of good topology

Begin Assignment 2 Part C.

10/3 Demo: Sculpting in Maya
View the Youtube tutorial:

Sculpting a basic landscape **(https://www.youtube.com/watch?v=QBCnEsdr-sY)**

(https://www.youtube.com/watch?v=QBCnEsdr-sY)

10/10 Fall Break

10/12 Arts Summit
View the Youtube tutorial:

Maya Tutorial - Quad Draw Tool **(https://www.youtube.com/watch?v=takFYSXDxzg)**

(https://www.youtube.com/watch?v=takFYSXDxzg)

10/17 Demo: retopologizing in Maya.
Work in class.

10/19 Continue Assignment 2 Part D in class.
View the Youtube tutorial:

Maya 2016 tutorial : Using the 3D paint tool to paint directly onto 3D objects **(https://www.youtube.com/watch?v=e6W-0XxpUmw)**

(https://www.youtube.com/watch?v=e6W-0XxpUmw)

10/24 Demo: Review UV Mapping, Texture Painting.
Continue Assignment 2 Parts D and E in class.

10/26 Continue Assignment 2 Parts D and E in class.
Final rendered images due Tuesday.

10/31 Critique Assignment 2 Part F.
Introduce Assignment 3.

11/2 Work on storyboards in class. Due Tuesday.

11/7 Discuss storyboards.
View the Youtube tutorial:

Understanding 3D Hierarchies and Creating FK controls in Maya. ***(https://www.youtube.com/watch?v=F2RQj0Is-C8)***

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(https://www.youtube.com/watch?v=F2RQj0ls-C8)

11/9 Demo character rigging, Part 1.
Work on rig in class.
View the Youtube tutorial:

Rigging an IK leg in Maya *(https://www.youtube.com/watch?v=WxogLUq1rd4)*

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(https://www.youtube.com/watch?v=WxogLUq1rd4)

Rigging an IK arm in Maya *(https://www.youtube.com/watch?v=WkKx9ijydjk)*

▷

(https://www.youtube.com/watch?v=WkKx9ijydjk)

Creating an FK/IK Arm Setup in Maya **(https://www.youtube.com/watch?v=M6ViCN_sPVE)**

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(https://www.youtube.com/watch?v=M6ViCN_sPVE)

11/14 Demo character rigging and basic FK/IK animation.
Work in class.
View the Youtube tutorials:

Blend shape editor and sculpting in Maya 2016 and 2017 morph targets **(https://www.youtube.com/watch?v=HLqYZcAfYfE)**

▷

(https://www.youtube.com/watch?v=HLqYZcAfYfE)

Tutorial: Maya Skin Weighting Overview **(https://www.youtube.com/watch?v=28UDAVZVRIg)**

▷

(https://www.youtube.com/watch?v=28UDAVZVRIg)

(https://www.youtube.com/user/thatstudio)

11/16 Demo: blend shapes and the Shape Editor
Demo: weight painting for skinning
Begin work on Assignment 3 Parts D and E in class.
View the Youtube tutorial:

Maya - Pose to Pose Animation (https://www.youtube.com/watch?v=HPuU18wEf7s)

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(https://www.youtube.com/watch?v=HPuU18wEf7s)

11/21 Demo: pose-to-pose animation.
Work on Assignment 3 in class.

11/23 Thanksgiving Break

11/28 Work on Assignment 3 in class.
Render and assemble final videos.

12/7 8:00 - 11:00 AM View and critique Assignment 3.

Architectural Presentation

Your presentation must be presented digitally, via projector, and should include the following information/images:

1. Identify your architect and his/her historical and geographic context.
2. Discuss those specific design principles, theories or strategies used by your architect that will be employed in your redesign. Use examples from the architect's work to illustrate your discussion of these ideas.
3. Show renderings of your Maya model of your living environment (from Part B) to familiarize your audience with the original space. You may also include photos and drawings here.
4. Show sketches, diagrams and images of your physical model to present your concepts for the redesign.
5. Have your sketches and physical model on hand as well, for further discussion.

Think of this presentation more as a slideshow of images, rather than the stereotypically didactic Powerpoint-type presentation of bulleted lines of text (even if you actually use Powerpoint to make your presentation.) You are, ideally, making a persuasive pitch for visual ideas. Use text sparingly, if at all.

Non-exhaustive list of architects:

Moshe Safdie

Norman Foster

Vitruvius

Andrea Palladio

Michelangelo Buonarroti

Étienne-Louis Boullée

Claude-Nicolas Ledoux

Christopher Wren

Sir Nicholas Hawksmoor

Thomas Jefferson

Daniel Burnham

Stanford White

Julia Morgan

Louis Sullivan

Frank Lloyd Wright

Bruno Taut

Le Corbusier

Albert Speer

Ludwig Mies van der Rohe

Walter Gropius

Philip Johnson

Charles Rennie Mackintosh

Alvar Aalto

Louis Kahn

I.M. Pei

Richard Rogers

Robert Venturi/Denise Scott-Brown

Herzog & De Meuron

Daniel Libeskind

Zaha Hadid

Rem Koolhaas

Frank Gehry

Tadao Ando

William McDonough

Santiago Calatrava

Thom Mayne

Jean Nouvel

Diller & Scofidio

Shigeru Ban

You may also pick an architect whose name is unknown to us, such as “Notre Dame Cathedral architect” or “Taj Mahal architect,” but you still must research historical or critical sources to establish the design principles to which you will be referring in your redesign.

Course Summary:

Date	Details

- **Architect Presentation** (https://uncg.instructure.com/courses/41944/assignments/271143)
- **Assignment 1 - redesign** (https://uncg.instructure.com/courses/41944/assignments/271144)
- **Assignment 2** (https://uncg.instructure.com/courses/41944/assignments/271145)
- **Assignment 3** (https://uncg.instructure.com/courses/41944/assignments/271146)
- **Roll Call Attendance** (https://uncg.instructure.com/courses/41944/assignments/271147)