

**ATENELO DE MANILA UNIVERSITY  
LOYOLA SCHOOLS**

**COURSE SYLLABUS**

COURSE NUMBER : CS 179.4  
 TITLE : Special Topics in Interactive Multimedia: 3D Modeling and Animation  
 DEPARTMENT : Information Systems and Computer Science  
 SCHOOL : Science and Engineering  
 SEMESTER AND SCHOOL YEAR: 2<sup>nd</sup> Semester, 2014-2015  
 NUMBER OF UNITS: 3  
 FACULTY : Mr. Nicko Reginio Caluya (ncaluya@ateneo.edu)  
 SCHEDULE & VENUE: MWF 1:30-2:30 PM, MWF

**A. COURSE DESCRIPTION**

This course was designed to cater to students who would like to be introduced to 3D Modeling and Animation concepts and applications, with Blender 2.72 as the primary tool to learn. Throughout the semester, different computer graphics topics will be explained and demonstrated in relation to generating virtual objects and to animating them. Hence the course complements the lessons learned from Computer Graphics Programming (CS 177), which should be an advisable foundation to grasp more complex detailing and rendering. It will also be output-intensive with weekly requirements, and some segments might require mathematics and physics.

**B. LEARNING OUTCOMES**

- to recognize the procedures taken in order to create 3D models and animations of great quality
- to familiarize oneself with Blender’s non-standard interface and usability features
- to demonstrate different computer graphics concepts and techniques and to translate them into detailing their outputs
- to prepare students who aspire to become 3D modelers and animators
- to create and evaluate computer-generated collaterals and masterpieces (still, videos, games) and apply them to appropriate contexts, and gain confidence to excel in this field of computer graphics.

**C. COURSE OUTLINE**

Week	Topic	Learning Objectives (The student can...)	Activities (The sessions will have...)	Student Output (The student must do...)
1 Nov	Introductions <ul style="list-style-type: none"> <li>• Syllabus</li> <li>• Classroom Management</li> <li>• History and Dev’t of 3D Modeling &amp; Animation</li> <li>• Blender</li> </ul>	<ul style="list-style-type: none"> <li>- trace the origins of the art and science of modeling and animation</li> <li>- establish Blender in the context of 3D modeling and animation production</li> </ul>	Class Groupings (2s & 4s) Class Discussion	DIAGNOSTIC TEST
2	Blender Interface & Concepts <ul style="list-style-type: none"> <li>• Windows and Preferences</li> <li>• Hotkeys and Shortcuts</li> </ul> Computer Graphics	<ul style="list-style-type: none"> <li>- outline the different convenience techniques when using Blender</li> <li>- translate particular computer graphics concepts in the context of rendering</li> </ul>	Class Discussion <i>Speed Modeling</i>	Quiz

	Review <ul style="list-style-type: none"> <li>• Meshes and Approximations</li> </ul>	models and animation <ul style="list-style-type: none"> <li>- construct precise yet economic models accordingly</li> </ul>		
3	Modeling <ul style="list-style-type: none"> <li>• Organic Modeling</li> <li>• Hard-Surface Modeling</li> <li>• Architectural Modeling</li> </ul>	<ul style="list-style-type: none"> <li>- distinguish differences among types of modeling</li> <li>- formulate own modeling procedures and strategies</li> <li>- decide on techniques and features given a modeling prompt</li> </ul>	Class Discussion <i>Elsewheres &amp; Invisible Cities</i>	Seatwork Homework [P]
4 Dec	Sculpting <ul style="list-style-type: none"> <li>• High-Poly Head Modeling</li> <li>• High-Poly Terrain/Environment</li> </ul>	<ul style="list-style-type: none"> <li>- develop the skill of digital sculpting for better contouring and organic modeling</li> <li>- create more complex models for more accurate representations of faces and terrains</li> </ul>	Class Discussion <i>Monuments &amp; Landmasses</i>	Seatwork Homework [I]
5	Shading and Texturing <ul style="list-style-type: none"> <li>• Realtime Shading (GLSL Viewport)</li> <li>• Procedural Texturing</li> <li>• UV Mapping</li> </ul>	<ul style="list-style-type: none"> <li>- survey Blender's shading and texturing options, as well as blending and materials</li> <li>- experiment on texturing combinations to achieve desired effects</li> <li>- illustrate how mesh textures are assembled before and after rendering</li> </ul>	Class Discussion <i>Working with Historical Textures and Textiles</i>	Seatwork Homework [P]
6	Lighting <ul style="list-style-type: none"> <li>• HDRi Lighting</li> <li>• Studio Lighting</li> <li>• 3-point Lighting</li> <li>• Hybrid Lighting</li> </ul>	<ul style="list-style-type: none"> <li>- examine the various lighting approximation techniques and equations</li> <li>- reproduce light behavior to improve shading</li> </ul>	Class Discussion <i>Interior Design (Room Setting)</i>	Quiz Seatwork Homework [I]
7 Jan	Rigging <ul style="list-style-type: none"> <li>• Constraints</li> <li>• Empties</li> <li>• Weight Painting</li> <li>• Drivers</li> </ul>	<ul style="list-style-type: none"> <li>- implement principles of human anatomy to prepare models for posing and animation</li> <li>- explore the mathematics behind various types of motion</li> </ul>	Special Lecture on Mathematics <ul style="list-style-type: none"> <li>• Inverse Kinematics and Dynamics</li> </ul> <i>Strike Some Poses</i>	MIDTERM EXAM
8	Animation <ul style="list-style-type: none"> <li>• Bone, Object, Shape Key Animations</li> <li>• Non-Linear Animation (NLA) system</li> <li>• Properties Animation</li> </ul>	<ul style="list-style-type: none"> <li>- discover the basic mechanisms of digital animation</li> <li>- apply different animation techniques to employ faster or more detailed rendering</li> </ul>	Class Discussion <i>Walk, walk, fashion baby</i>	Seatwork Homework [I]
9	Physics Simulations <ul style="list-style-type: none"> <li>• Rigid Body Dynamics <ul style="list-style-type: none"> <li>• Fracture</li> <li>• Dynamic Objects</li> </ul> </li> <li>• Fluid Dynamics</li> <li>• Smoke Simulation</li> <li>• Cloth Simulation</li> <li>• Soft Bodies</li> <li>• Particles <ul style="list-style-type: none"> <li>• Hair</li> <li>• Halo</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- demonstrate simulations derived from physics concepts, particularly on materials science</li> <li>- improvise ways to render scenes involving physics to the advantage of being fantastic or realistic</li> </ul>	Class Discussion <i>Weather and Disaster Simulation</i>	Quiz Homework[G]

10	Rendering <ul style="list-style-type: none"> <li>• Cameras</li> <li>• Stills Rendering</li> <li>• Animation Rendering</li> <li>• Output formats</li> <li>• Playblast Rendering</li> </ul>	<ul style="list-style-type: none"> <li>- emphasize the camera(s) as crucial element in rendering</li> <li>- prepare the framing of scene(s) with appropriate camera and rendering settings</li> </ul>	Class Discussion <i>Product Placement</i>	Seatwork Homework[I]
11 Feb	Post-Processing <ul style="list-style-type: none"> <li>• Noodles</li> <li>• Color Correction</li> <li>• Compositing</li> </ul>	<ul style="list-style-type: none"> <li>- appraise processed results in order to modify and improve renders</li> <li>- examine the capacities and limitations of Blender to render models and animation</li> </ul>	Class Discussion <i>Achieving Photo Finishes</i>	Seatwork Homework[I]
12	Video Editing <ul style="list-style-type: none"> <li>• Transitions, Effects, Titles</li> <li>• Audio Overlay</li> </ul>	<ul style="list-style-type: none"> <li>- enhance finished renders in order to narrate a visual</li> <li>- incorporate audio to complement visuals</li> </ul>	Class Discussion <i>Synchronizing Animation to Music</i>	Homework[G]
13	Modeling in Games Design <ul style="list-style-type: none"> <li>• Blender Game Engine</li> <li>• Importing to Unity</li> </ul>	<ul style="list-style-type: none"> <li>- create 3D models and animation as assets to produce games with at least simple mechanics</li> </ul>	Class Discussion Interviews from the Industry <i>Towards Creating a Mini-game</i>	Seatwork Homework[G]
14	Augmented Reality <ul style="list-style-type: none"> <li>• Designing High-Performance, Efficient Models</li> </ul>	<ul style="list-style-type: none"> <li>- integrate the concept of virtuality-reality to make models and animations the system input</li> </ul>	Class Discussion <i>Towards Virtual Immersion of Your Creation</i>	Homework[G]
15 Mar	FINAL PROJECT AND PRESENTATION			

#### D. REQUIRED READINGS

Blain, J. M. *The Complete Guide to Blender Graphics*. CRC Press Taylor & Francis Group: Florida, USA, 2012.

Blender User Manual (<http://wiki.blender.org/index.php/Doc:2.6/Manual>)

Blender Hotkey Reference (<http://download.blender.org/documentation/BlenderHotkeyReference.pdf> or <http://wiki.blender.org/index.php/Doc:2.4/Reference/Hotkeys/Map>)

#### E. SUGGESTED READINGS

Blend for Web Demos (<https://www.blend4web.com/en/demo/>)

Hess, D. R. *Animating with Blender : how to create short animations from start to finish*. Elsevier/Focal Press Amsterdam/Boston. 2009.

#### F. COURSE REQUIREMENTS

COMPONENT	PERCENTAGE
Quizzes/Homework	35%
Midterm Exam	20%
Final Project	20%
Final Presentation	25%
TOTAL	100%

## G. GRADING SYSTEM

<b>93+</b>	<b>A</b>	<b>Excellent</b>
<b>87-92</b>	<b>B+</b>	<b>Very Good</b>
<b>81-86</b>	<b>B</b>	<b>Good</b>
<b>75-80</b>	<b>C+</b>	<b>Fair</b>
<b>69-74</b>	<b>C</b>	<b>Passing</b>
<b>60-68</b>	<b>D</b>	<b>Minimally Passing</b>
<b>&lt; 60</b>	<b>F</b>	<b>Fail</b>

For each output (whether as project or as homework), the following rubrics will be observed:

<b>Criterion</b>	<b>Description</b>
<b>Lightness</b>	<ul style="list-style-type: none"> <li>renders and/or animates the models in the most efficient ways possible (smallest number of primitives and vertices, culling)</li> <li>results in the smallest file size, as per instructor's requirement*</li> </ul>
<b>Quickness</b>	<ul style="list-style-type: none"> <li>submits in the earliest time possible*</li> <li>imitates or creates a model within a very short span of time</li> </ul>
<b>Exactitude</b>	<ul style="list-style-type: none"> <li>renders and/or animates the models in the most accurate/realistic ways possible (definition of surfaces, resemblance of actual objects)</li> <li>poses and frames the scene (camera,</li> </ul>
<b>Visibility</b>	<ul style="list-style-type: none"> <li>pays attention to visual detail: lighting (esp. normals), shading, materials and textures correctly implemented</li> <li>uses all assets and objects for the scene (no extras), in their appropriate sizes, positions, and proportions against each other</li> </ul>
<b>Multiplicity</b>	<ul style="list-style-type: none"> <li>organizes multiple scene objects, keyframes clearly and efficiently</li> <li>animates in a wide range (the most number) of poses available to be constructed for rendering*</li> </ul>
<b>Consistency</b>	<ul style="list-style-type: none"> <li>sees the general concepts and artistic vision behind scenes (even though animation and modeling requires a combination of chaos and order)</li> <li>tells a narrative with every output submitted in class</li> </ul>

*\*those who are able to accomplish these tasks better than their classmates will be given a 0.1 advantage in their final score for that output.*

## H. CLASSROOM POLICIES

1. The instructor will check attendance every meeting. If you are caught exceeding your allowable cuts for the semester, you may be given a grade of W. Perfect attendance will merit +1.0 in the final grade.
2. In case you cut, it will be your sole responsibility to make up for the missed discussions and materials, not your partner's, not any one of your groupmate's.
3. The course website must be checked every now and then in case of addition or modification of resources (lectures, .blend files, etc.). Take this to your advantage.
4. Playing games or using social networks is strictly prohibited during the class, unless it is related to the subject matter at hand. Think about those unfortunate students who were very keen to be part of this class but they cannot enrol anymore, yet you are here.
5. Even though quizzes are already outlined or anticipated in the course schedule, unannounced quizzes can still be administered.
6. No make-up quizzes will be given unless due to sickness and emergencies, which should urgently be reported to the instructor.

7. Use of communication devices and/or gaming consoles are not allowed during the class. They must be turned off or in silent non-vibrating mode. Rest assured that the instructor will only use a phone to check time.
8. Cheating will not be tolerated in any form, in any requirement. At the very least, the questionable work will merit a grade of 0 and will be reported to the appropriate authorities, as provided for by the Student Handbook. Duplicate projects/hands-on activities will merit penalties for both the student who copied and the student from whom the work was copied.
9. Students are expected to comply with the DISCS Academic Integrity Policy. With each submission, students must include a Certificate of Authorship, whether individual or in group. In addition, students must clearly acknowledge and specify any help from outside sources, whether online or from persons. Failure to acknowledge such may be interpreted as intellectual dishonesty. Consult the course website for details on these policies.
10. Additional policies may be implemented by the instructor with due discussion with the class when the need arises.

## I. CONSULTATION HOURS

Consultations is most preferably arranged via an appointment. Please send an e-mail with the subject "CS 179.4 Consultation" to the address given above. Regularly, I open up 2:30-4:30 PM on Mondays and Wednesdays for consultations, at Ateneo Laboratory for the Learning Sciences, Faura Room 224.