



<b>Course Code</b> MULT-370	<b>Course Title</b> Advanced 3D Modeling and Animation	<b>ECTS Credits</b> 6
<b>Department</b> Design & Multimedia	<b>Semester</b> Fall, Spring	<b>Prerequisites</b> None
<b>Type of Course</b> Elective	<b>Field</b> Applied Multimedia	<b>Language of Instruction</b> English
<b>Level of Course</b> Undergraduate	<b>Year of Study</b> 3 <sup>rd</sup>	<b>Lecturer</b> Chris Christou
<b>Mode of Delivery</b> Face-to-face	<b>Work Placement</b> N/A	<b>Co-requisites</b> None

### Objectives of the Course:

The main objectives of the course are to:

- Introduce the students to advanced concepts of computer generated 3D graphics.
- Train students in using the software 3DStudio Max for advanced modeling of surfaces using various methods of mesh approximation.
- Provide students with an appreciation of photometry, optics and light effects in nature and how they may be simulated using a computer.
- Introduce students to character animation using biped systems

### Learning Outcomes:

After completion of the course students are expected to be able to:

1. Utilize principles of coordinate systems, rigid body transformations, photometry, optics and image formation.
2. Create complex 3D object using box modeling, patch surfaces and NURBS
3. Create appropriately lit scenes with realistic materials and textures and using advanced lighting methods using global illumination.
4. Setup daylight systems to model natural illumination.
5. Create basic cartoon characters using mesh approximation and use methods for polygon reduction
6. Apply biped systems to characters in order to animate them.
7. Use motion capture, footstep creation and key-framing techniques in character animation

### Course Contents:

1. 3DS Max software review: Editing, Helpers and Utilities, Units of Measurement, Precision, Snapping, Arrays and Spacers.
2. Mathematical Concepts: Points, Lines, Planes, Curves, Splines. Rigid Body Transformations.
3. Transformations (e.g. stretch, shatter, bend, twist, scale). Free-Form Deformations (FFD) in 3DS.
4. Box Modeling, Spline Modeling and Editing, Spline Patches, Bezier Patches.
5. Physical Illumination Models, Photometric Lighting, Radiosity, Daylight, Global Illumination, Indirect Illumination, Radiosity methods in 3DS Max.
6. Character Modeling. Bones, Biped Skeletons, Skinning & Skin Envelopes, Physique Modifiers.
7. Character animation. Inverse Kinematics, Key-framed character animation, Motion Capture.

8. Physical Systems, Dynamics, Gravity, Velocity, Acceleration.
9. Physical dynamics, Simulating dynamics, Physics Engines, Rigid Body Simulations.
10. Particle Systems. Simulating natural effects: fire, explosions, smoke, clouds, fog, snow, dust, meteor trails, and hair. Space warps
11. Project planning, computer issues, polygon reduction, time issues.

**Learning Activities and Teaching Methods:**

Lectures, Lab Presentations, Lab Tutorials, Practical Exercises and Assignments.

**Assessment Methods:**

Homework, Project, Mid-Term, Final Project.

**Required Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Derakhshani, D & Munn, R. L.	Introducing 3ds MAX 9: 3D for Beginners	SyBex	2007	978-0-4700-9761-8

**Recommended Textbooks/Reading:**

Authors	Title	Publisher	Year	ISBN
Kelly L. Murdock	3DS Max 9 Bible,	Wiley	2007	0470100893