



## Course Syllabus

<b>Course Code</b>	<b>Course Title</b>	<b>ECTS Credits</b>
MULT-370	Advanced 3D Modeling and Animation	6
<b>Prerequisites</b>	<b>Department</b>	<b>Semester</b>
MULT-361	Design & Multimedia	Fall, Spring
<b>Type of Course</b>	<b>Field</b>	<b>Language of Instruction</b>
Elective	Design & Multimedia	English
<b>Level of Course</b>	<b>Lecturer(s)</b>	<b>Year of Study</b>
1 <sup>st</sup> Cycle	Dr C G Christou	3 <sup>rd</sup> /4 <sup>th</sup>
<b>Mode of Delivery</b>	<b>Work Placement</b>	<b>Corequisites</b>
Face-to-Face	NA	

### Course Objectives:

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.
- Provide instruction on creation and animation of virtual characters using key-framed animation and motion capture sequences.

### Learning Outcomes:

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

1. Understand principles of coordinate systems, rigid body transformations, photometry, optics and image formation.
2. Create complex 3D surfaces using a variety of techniques including patch surfaces and NURBS
3. Create appropriately lit scenes with realistic materials and textures and using advanced lighting methods simulating global illumination.
4. Setup daylight systems to model natural illumination and animate this.
5. Create basic 3D characters using mesh approximation and use methods for polygon reduction.

6. Applied biped systems to characters in order to animate them.
7. Use motion capture, footstep creation and key-framing techniques in character animation.

**Course Content:**

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. Project planning, computer issues, polygon reduction, time issues.

**Learning Activities and Teaching Methods:**

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

**Assessment Methods:**

Assignments (2)
Mid Term exam
Final Project

**Required Textbooks / Readings:**

Learning Virtual Reality: Developing Immersive Experiences	Tony Parisi	O'Reilly Media; 1 edition	2015	1491922834
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and Applications for Desktop, Web, and Mobile				
3DS Max Modelling for Games, Vol 1, 2nd Edition	Andrew Gahan	Focal Press	2011	0240815823