



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