

Liverpool John Moores University

Title: COMPUTER MODELLING, VISUALISATION & ANIMATION
Status: Definitive
Code: **5022COMP** (102966)
Version Start Date: 01-08-2011

Owning School/Faculty: Computing and Mathematical Sciences
Teaching School/Faculty: Computing and Mathematical Sciences

Team	Leader
Stephen Tang	Y

Academic Level: FHEQ5
Credit Value: 24.00
Total Delivered Hours: 72.00
Total Learning Hours: 240
Private Study: 168

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24.000
Practical	48.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Individual Project involving 2D and 3D modelling and visual effects production and presentation	40.0	
Report	AS2	Group work covers: project using a 3D animation software with compositing of all the effects learned in the module.	60.0	

Aims

This module will explore computer animation and visualisation techniques including: 2D and 3D, modelling, rendering, animation, special visual effects, interactive devices, procedural animation, various motion control and deformation techniques,

techniques for animation of natural phenomena (particle systems, flocking, plant growth....), collision detection and animation systems.

Learning Outcomes

After completing the module the student should be able to:

- 1 Explain various animation and visualisation techniques and select appropriate algorithms to generate motion and visual effects for 2D and 3D animated sequences.
- 2 Storyboard, compose, and render a 2D cel-based animated sequence.
- 3 Produce 3D models using appropriate tools and techniques.
- 4 Use 3D Modelling and Animation software tools (for example 3DSMax, Maya or Blender) to produce motion and visual effects for an animated sequence.
- 5 Implement animation and visualisation techniques using scripting language.
- 6 Report with appropriate documentation the stages and techniques applied for a given computer animation and visualisation product.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

2D and 3D modelling	2	6				
3D animation	1	3	4	5	6	

Outline Syllabus

Computer Animation: Background and History

Principle of Animation (2D, 3D Animation)

Computer Animation Software, Animation and Visualisation Hardware

Colour Science and Colour Models - RGB, LAB, CMYK, graphical representation.

Image Quality - colours, aliasing, dithering.

Animation Delivery Mechanisms: Flip-book, Cell, Object-orientated, Path-based and Tweened Animations

Story-Boarding, scene composition and rendering

Real-time rendering, Animation languages - scripting

3D Modelling: modelling: Three-Dimensional Co-ordinates ; Polygon Model - characteristics, data structure ; Solid Models - constructive solid geometry ; Spline surfaces - Bezier, NURBS, tools, methods

3D effects: shading, lighting, texturing, ...

Key-Framing /Track-based Animation

Motion specification: direct, goal directed, kinematics and dynamics, control hierarchy.

Physical-based animation

Character animation: Character development and modelling, Principles of character animation, 3 Using IK and FK, Pose to pose animation.

Advanced and Emergent Behavioural Animation: for example-Particle and flocks, plant growth, Cloth and hair animation

Procedural Method: for example-Kinematic, Rigid Body Animation,...

Learning Activities

Lectures incorporating demonstrations and discussion will be followed by tutor-led sessions. These will be supported by practical hands-on work in the laboratory.

References

Course Material	Book
Author	El Rhalibi, A. and Shen, Y.
Publishing Year	2004
Title	Animation
Subtitle	Berkshire Encyclopedia of Human-Computer Interaction. Volume 1. p. 13-17.
Edition	
Publisher	Berkshire Publishing Group.
ISBN	

Course Material	Book
Author	Foley et al
Publishing Year	1990
Title	Computer Graphics: Principles & Practice
Subtitle	
Edition	2nd Edition
Publisher	Wesley
ISBN	0201848406

Course Material	Book
Author	Griffin, H.
Publishing Year	0
Title	Animators Guide to 2D Animation
Subtitle	
Edition	
Publisher	Focal Press
ISBN	024051579X, Y

Course Material	Book
Author	Murdock, K.L.
Publishing Year	2005
Title	3ds max® 7 Bible
Subtitle	
Edition	
Publisher	John Wiley & Sons;

ISBN	0764579711
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Course Material	Book
Author	Bousquet, M.
Publishing Year	2005
Title	Model, Rig, Animate with 3DS Max 7
Subtitle	
Edition	
Publisher	New Riders
ISBN	0321321782

Course Material	Book
Author	Watt, A. Watt, M.
Publishing Year	1992
Title	Animation and Rendering Techniques Theory and Practice
Subtitle	
Edition	
Publisher	Addison -Wesley
ISBN	0201544121

Course Material	Book
Author	Thomas, F. Johnson, O.
Publishing Year	1981
Title	Disney Animation: The Illusion of Life
Subtitle	
Edition	
Publisher	Abbeville Press New York
ISBN	089659498X

Course Material	Book
Author	Kerlow, I. V.
Publishing Year	2000
Title	The Art of 3-D Computer Animation and Imaging
Subtitle	
Edition	
Publisher	Van Nostrand Reinhold
ISBN	0442018967

Course Material	Book
Author	Parent, R.
Publishing Year	2001
Title	Computer Animation: Algorithms and Techniques
Subtitle	
Edition	
Publisher	Morgan-Kaufmann, San Francisco
ISBN	

Course Material	Book
Author	Magenat-Thalmann, N. (Editor), Thalmann, D.
Publishing Year	1996
Title	Interactive Computer Animation
Subtitle	
Edition	
Publisher	Prentice Hall
ISBN	

Notes

This course introduces techniques for computer modelling, animation and visualisation such as keyframing, procedural methods, behavioural animation, and natural phenomenon simulation. The course also includes the use of a 2D and 3D Modelling and Animation software.