

Lingnan University

Course Syllabus

Course Title	:	3D Modelling and Animation
Course Code	:	CDS3107
Recommended Study Year	:	Year 3
No. of Credits	:	3
Mode of Tuition	:	Sectional Approach
Class Contact Hours	:	3 hours per week
Category	:	Major Elective
Discipline	:	Nil
Prerequisite(s)	:	CDS2103 Machine Learning for Innovative Design
Co-requisite(s)	:	Nil
Exclusion(s)	:	Nil
Exemption Requirement(s)	:	Nil

Brief Course Description:

With the growing demand for immersive digital experiences in gaming, film, and interactive media, three-dimensional (3D) modelling and animation have become essential skills for creative and technical professionals. This course offers a comprehensive introduction to the principles and techniques used to create and animate 3D content. Students will learn how to design 3D objects using industry-standard modelling tools, apply textures and materials for realistic surfaces, and implement lighting and rendering workflows to produce visually compelling scenes. The course also explores animation fundamentals, including keyframing, rigging, and motion paths, enabling students to bring static models to life through dynamic movement. Emphasis is placed on both technical proficiency and artistic creativity, preparing students to work within professional production pipelines. Through hands-on projects and assignments, students will develop 3D environments and animated sequences, culminating in a portfolio-ready project.

Aims:

This course aims to:

1. Introduce fundamental concepts of 3D geometry, modelling, and animation.
2. Develop students' technical skills in creating and animating 3D objects and scenes.
3. Foster an understanding of animation principles and visual storytelling.
4. Enable students to evaluate 3D works critically from both technical and artistic perspectives.

Learning Outcomes (LOs)

Upon successful completion of this course, students will be able to:

1. Understand and explain fundamental concepts of 3D representation, including meshes, coordinates, transformations, and materials. (PILO1, PILO2)
2. Create and refine 3D models with appropriate topology, scale, and structure. (PILO2, PILO5)
3. Apply basic animation principles to create believable motion and simple animated sequences. (PILO3, PILO5)
4. Produce a complete 3D scene or animation by integrating modelling, texturing, lighting, and animation. (PILO5, PILO6)

Indicative Contents:

Introduction to 3D Graphics

This topic introduces the overall 3D graphics pipeline, with a focus on coordinate systems and geometric transformations that underpin 3D representation and rendering.

Polygonal Modelling

Students learn fundamental mesh structures and topology and apply polygonal modelling techniques to create hard-surface models and simple organic objects.

Materials, Textures, and Lighting

This section covers basic material and shading models, texture mapping methods, and fundamental lighting techniques for enhancing visual realism.

Principles of Animation

Students are introduced to keyframes and timelines, as well as core animation principles such as timing, spacing, and motion for creating believable movement.

Rigging and Motion Basics

This topic introduces simple rigging concepts and their application to object and basic character animation.

Scene Composition and Rendering

Students learn camera setup, visual composition, and essential rendering techniques to produce final visual outputs.

Final Project Presentation

Students demonstrate their completed projects and participate in peer critique and reflection to

evaluate design decisions and learning outcomes.

Teaching Methods:

The course adopts a combination of lectures, studio sessions, critiques, and projects to support both conceptual understanding and practical skill development. Lectures introduce the conceptual foundations of 3D graphics, modelling, and animation, accompanied by demonstrations of key techniques. Studio sessions provide hands-on practice in modelling and animation, while structured critiques offer timely feedback on student work. A series of progressive assignments culminates in a final integrated project that consolidates learning outcomes.

Measurement of Learning Outcomes:

LOs \ Assessment	In-class Participation and Practice	Modelling Assignments	Animation Assignment	Final 3D Project
	(15%)	(25%)	(20%)	(40%)
LO1	✓	✓		✓
LO2		✓		✓
LO3			✓	✓
LO4				✓

1. Class attendance and participation assess students' engagement in learning activities and their understanding of fundamental concepts of 3D representation, including meshes, coordinate systems, transformations, and materials introduced in lectures and demonstrations (LO1).
2. Modelling Assignments are designed to progressively assess students' ability to apply polygonal modelling techniques to create and refine 3D models with appropriate topology, scale, and structure, demonstrating practical modelling skills and technical proficiency (LO1, LO2).
3. The Animation Assignment evaluates students' ability to apply basic animation principles, including keyframes, timing, and spacing, to create believable motion and simple animated sequences (LO3).
4. The Final 3D Project (Model + Animation + Presentation) assesses students' capability to integrate modelling, texturing, lighting, and animation to produce a complete 3D scene or animation. The project also evaluates students' ability to organize and present their work clearly, demonstrating an understanding of the overall 3D production pipeline (LO1, LO2, LO3, LO4).

Assessment:

In-class Participation and Practice	15%
Modelling Assignments	25%
Animation Assignment	20%
Final 3D Project	40%
Total	100%

Required/Essential Readings:

1. Hess, Roland. Blender Foundations: The Essential Guide to Learning Blender
2. Parent, R. Computer Animation: Algorithms and Techniques. Morgan Kaufmann.

Recommended/Supplementary Readings:

1. Murdock, Kelly L. Blender Foundations. Wiley.
2. Derakhshani, Dariush. Introducing Autodesk Maya. Wiley.
3. Williams, Richard. The Animator's Survival Kit. Faber & Faber.

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations and Course Work. In particular, plagiarism, being a kind of dishonest practice, is “the presentation of another person’s work without proper acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student’s own work”. Students are required to strictly follow university regulations governing academic integrity and honesty.
- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students’ understanding of plagiarism, a mini-course “Online Tutorial on Plagiarism Awareness” is available on <http://pla.ln.edu.hk/>.

Students must adhere to the University’s guidelines and practices when using Generative Artificial Intelligence (GAI) tools. The official documents “Guidelines for Using GAI Tools at Lingnan University” and “Best Practices for Ethical and Responsible Use of GAI Tools in Course Assessments” can be found here: <https://www.ln.edu.hk/tlc/generative-artificial-intelligence/gai-guidelines-best-practices>.

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Course Rubrics

Rubric for In-class Participation and Practice (15%)

Criteria	Excellent (90-100)	Good (70-89)	Pass (50-69)	Fail (0-49)
Attendance and Participation (6%)	Attends over 90% of sessions and actively engages in studio practice.	Attends at least 80% of sessions with regular engagement.	Attends at least 70% of sessions with limited engagement.	Attends less than 70% of sessions.
Hands-on Practice (5%)	Completes all practice tasks accurately with strong technical understanding.	Completes most tasks correctly with minor errors.	Completes basic tasks but with technical difficulties.	Fails to complete tasks or shows minimal effort.
Studio Interaction (4%)	Actively contributes to critiques and discussions with constructive feedback.	Participates occasionally in critiques.	Limited participation in discussions.	No meaningful participation.

Rubric for Modelling Assignments (25%)

Criteria	Excellent (90-100)	Good (70-89)	Pass (50-69)	Fail (0-49)
Modelling Accuracy and Topology (10%)	Models are structurally sound with clean topology and correct scale.	Models are mostly correct with minor topology issues.	Models are basic with noticeable structural problems.	Models are incomplete or technically flawed.
Use of Materials and Details (10%)	Appropriate materials and details enhance realism and visual quality.	Materials are generally appropriate with minor issues.	Limited or simplistic use of materials.	Materials are missing or inappropriate.
Technical Execution (5%)	Demonstrates confident and efficient use of 3D tools.	Demonstrates adequate tool usage with minor inefficiencies.	Basic tool usage with frequent errors.	Inability to use tools effectively.

Rubric for Animation Assignment (20%)

Criteria	Excellent (90-100)	Good (70-89)	Pass (50-69)	Fail (0-49)
Application of Animation Principles (10%)	Motion is smooth, believable, and follows core animation principles.	Motion is generally believable with minor timing issues.	Motion is basic with limited application of principles.	Motion is unnatural or poorly executed.
Timing and Control (10%)	Excellent control of timing, spacing, and keyframes.	Adequate control with minor inconsistencies.	Limited control with noticeable problems.	Poor control or incomplete animation.

Rubric for Final 3D Project (40%)

Criteria	Excellent (90-100)	Good (70-89)	Pass (50-69)	Fail (0-49)
Integrated 3D Production (15%)	Seamlessly integrates modeling, texturing, lighting, and animation.	Integrates major components with minor weaknesses.	Basic integration with limited coherence.	Components are poorly integrated or missing.
Visual Quality and Creativity (20%)	High visual quality with strong artistic expression and originality.	Good visual quality with some creative elements.	Adequate quality but limited creativity.	Low visual quality with little creativity.
Presentation and Communication (5%)	Clear, well-organized presentation and explanation of work.	Mostly clear presentation with minor issues.	Somewhat unclear presentation.	Poorly presented and difficult to understand.