Liverpool John Moores University

Title:	Advanced 3D Games Development
Status:	Definitive
Code:	**6205COMP** (128025)
Version Start Date:	01-08-2021
Owning School/Faculty:	Computer Science and Mathematics
Teaching School/Faculty:	Computer Science and Mathematics

Team	Leader
Chris Carter	Y
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Academic Level:	FHEQ6	**Credit Value:**	20	**Total Delivered Hours:**	44
Total Learning Hours:	200	**Private Study:**	156		

Delivery Options

Course typically offered: Semester 1

Component	**Contact Hours**
Workshop	44

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Artefacts	AS1	Development of a Vertical Slice Prototype using Ludic Game Design and Agile Methodology	100	

Aims

To compare and contrast architectural approaches to building a game engine architecture.
To compare and contrast Narratology vs Ludology approaches to game specification.
To gain an understanding and implementation experience of advanced game programming methods and techniques, especially in terms of game engines and 3D graphics.

To understand how game engine design and architectures can be applied to the Games Software Development Lifecycle to formulate, plan and manage the development of a Vertical Slice Prototype.

Learning Outcomes

After completing the module the student should be able to:

1 Formulate Technical and Game Design Specifications using Ludology for Mechanics, Challenges and Internal Economies.

2 Synthesize the technical design into a Vertical Slice Prototype using the modular architecture and associated toolset of a modern game's engine.

3 Employ Agile Software Development methodologies to realise the prototype game software.

4 Evaluate the fundamental techniques of a specific games' domain and their application to a complex mechanic using appropriate game engine modules.

Learning Outcomes of Assessments

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

Prototype development	1	2	3	4

Outline Syllabus

Structures of Modern Game Engines
Games Development Ecosystem
Implementation of Core Game Loop and Graphics Pipeline into a Game Engine
Agile Development and Reuse Oriented Development
Ludology vs Narratology
Ludic Games Development Principles
Agile Development Approaches and Functional Specification Techniques
Technical Design Documentation and associated UML and CASE Tools
Data-Driven Games Development
Asset Conditioning and Data Integration
Runtime vs Offline Processing and Associated Toolsets
Advanced Object-Oriented Design Concepts
Advanced Industry Standard Language concepts for Games Programming
Low-level game hardware architectures.
Hardware-focused programming techniques.
Game Object Model Frameworks and Related Language Constructs
Emergent vs Scripted Behaviours.
Scripting for Gameplay and Game Object Models
Collisions, Materials, Interaction Models.
Fundamentals of Non-Playable Character interactions.
Animation and Kinematic Motion in Games.
Testing, Debugging and Profiling a Games Engine.
Spatial Design of Game Levels via Meshing and Constructive Solid Geometry
Logical Design of Game Levels

CPU->GPU Architectural Concerns and CPU->GPU Data Exchange
Key Data Exchange (e.g. Transforms and Scene Information)
Optimisation Techniques

Learning Activities

Workshops are used to combine the delivery of the theoretical concepts on 3D games software and game engine development and tutor-led practical exercises. Additional exercises for students to work on in their own time related to game design, software specification and experience of the toolset and engine APIs within the specified games engine.

Notes

This module will cover the software engineering principles used to implement a full-scale game engine in order to build complex, large-scale 3D games (commonly termed Triple-A games in the games industry).
We will focus on the core modules of a modern engine, as well as its gameplay framework. We will explore the game play foundations of the games which are built on top the engine.
We will look at various architectural design strategies and provide in-depth coverage of various core modules within a game engine and how they relate to the other domain of study computer games development students have covered.
This involves studying advanced programming techniques, use of Scripting Languages and Engine Toolsets and practically applying them in order to construct an advanced 3D game on top of a game engine.
Students will apply the concepts of Ludology and formal software specification, to design, develop and deploy a Vertical Slice prototype to a modern gaming platform via a Triple-A (AAA) games engine.