

## Liverpool John Moores University

Title: ADVANCED SOFTWARE ENGINEERING FOR GAMES  
Status: Definitive  
Code: **7118COMP** (121341)  
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics  
Teaching School/Faculty: Computer Science and Mathematics

Team	Leader
Abdenmour El-Rhalibi	Y
Chris Carter	
Sud Sudirman	

**Academic Level:** FHEQ7      **Credit Value:** 20      **Total Delivered Hours:** 57

**Total Learning Hours:** 200      **Private Study:** 143

### Delivery Options

Course typically offered: Semester 1

Component	Contact Hours
Lecture	22
Practical	33

**Grading Basis:** 50 %

### Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Exam	Exam	Examination	50	2
Artefacts	AS1	Advanced 3D game toolset prototyping	50	

### Aims

*To apply the object oriented and data oriented paradigms in a toolset development environment and how data-driven architectures can be used for localisation, internationalisation and product lifecycle extension.*

*To appraise different software development methodologies and the impact that a*

*specific methodology has on the development paradigm and development process used.*

*To develop advanced programming skills using techniques such as templates, design patterns, GPGPU and parallel programming*

*To leverage game technologies in combination with traditional UI-driven programming for use in alternative domains such as simulation, data visualisation and business application development and tools production.*

## **Learning Outcomes**

After completing the module the student should be able to:

- 1 Appraise software engineering methodologies and tools in the context of an iterative development approach.
- 2 Implement advanced software engineering, game programming and general development techniques for game engine toolsets.
- 3 Critically evaluate advanced software development tools and methodologies.

## **Learning Outcomes of Assessments**

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

Examination	1	3
Prototype advanced 3D game	1	2

## **Outline Syllabus**

*Advanced Data Structures and Algorithms:*

*- Custom Collections and Iterators*

*Data Driven Games Development and Data Oriented Programming*

*- Programming as Data Transforms.*

*GPGPU Programming*

*- Using GPGPU for Parallelisation of Game Techniques*

*- Generalising GPU Programming:*

*- Compute*

*- OpenCL/Cuda*

*Software Engineering Methodologies for Game Programming*

*- Agile, RAD, LEAN, etc.*

*- Mobile Games Development – Managed vs Native Programming*

*Advanced Object Oriented Programming*

*- Dependency Injection / Inversion of Control*

*- Advanced Abstraction Techniques.*

*Game Design Patterns*

- *Gang of Four – Command, State, Singleton, Observer, Flyweight*
- *Sequencing Patterns*
- *Behavioural Patterns*
- *Decoupling Patterns*
- *Optimisation Patterns*

*Parallel vs Sequential Programming Techniques in C++*

- *AMP*
- *Loop Unrolling / Vectorisation*
- *Threading, Mutex, Locks*

*Developing Tools using Accelerated Render Targets and UI Frameworks.*

*Applying Game Technologies to simulation and data visualisation.*

*Game Technologies for Information Systems.*

*Localisation and Testing.*

*QA and Internationalisation.*

*Source Control Management and Project Management.*

*Data Driven Architectures for Support Systems*

*Accelerated Graphics in a Web Environment.*

*Game Editor Architecture and Platform Integration.*

## **Learning Activities**

Lectures – to deliver the theoretical concepts on advanced software engineering applied to computer games development.

Practical – Tutor-led practical session in the computer laboratory.

Further exercises – additional exercises for students to work on in their own time.

Directed learning – provides additional reading to enable practical work to be completed.

Learning materials can be accessed digitally via University Virtual Learning Environment (VLE).

## **Notes**

In this module, students will be exposed to the wider fields of development in the games industry, outside of core game programming. Students will develop advanced software engineering skills using programming strategies such as design patterns, optimised data structures, data-oriented programming paradigm and GPGPU programming. The focus will be on the practical application of these techniques to the wider games industry development ecosystem and how game technologies can be leveraged in domains other than games development.

Students will be working in team and learn to build a production tool-chain, which utilises data-driven game development, optimised real-time performance and the utilisation of the GPU for non-graphical tasks. The process of building a toolset will demonstrate the importance of a multi-disciplinary approach to development and how development team members in a specific role collaborate in order to create a

coherent ecosystem.