WM9M2-15 Computer Graphics

24/25

Department
WMG
Level
Taught Postgraduate Level
Module leader
Kurt Debattista
Credit value
15
Module duration
4 weeks
Assessment
100% coursework
Study location
University of Warwick main campus, Coventry

Description

Introductory description

Visual computing has become ubiquitous in the modern educational, commercial and industrial landscapes in the use of product design and development, video games, simulation, computer aided education, advertising, digital photography, entertainment and countless other fields. The knowledge of advanced computer imagery concepts and applications based on visualisation and computer graphics are fundamental tools for any technology-led organisation.

Computer graphics remains one of the three main core components of visual computing (the others being vision and image processing), and is the funadmental discipline for the development and implementation of video games. This module will introduce the funadmental mathematical, computing and physics-based methods that the constitute the field. In particular, focus will be placed on understanding the overall theory, algorithms and data structures that form the discipline. Advanced programming methods used in cutting-edge video games will be introduced and students will learn how to implement such methods and develop new ones. Performance lies at the heart of computer graphics in video games and the module will give the students the ability to select or develop new solutions that resolve the graphical challenges they will face when developing video games.

This module will be the first dedicated module for the MSc in Games Engineering. It will be a natural follow on to the more general Progamming and Fundamental Algorithms module that will be the first that the students attend. It will extend the knowledge gained in that module to focus on

algorithms, data structures and programming within the domain of computer graphics.

Module aims

This module aims to provide students with the fundamental algorithmic, mathematical and programming skills required to develop high-level computer graphics at the interactive rates required for video games.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Computer graphics introduction

Mathematics for computer graphics

Data Structures for computer graphics

Graphics pipelines

Graphics architectures

Fundamental computer graphics algorithms

Rendering

Graphics APIs

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate and evaluate the core technologies used for computer graphics
- Identify, at every stage of the graphics pipeline the critical choices that can be made in the design of their applications, appropriate to the solution they are providing.
- Have an in-depth understanding of a computer graphics API for video game development

Indicative reading list

Hughes, J. F., Van Dam, A., McGuire, M., Foley, J. D., Sklar, D., Feiner, S. K., & Akeley, K. (2014). Computer graphics: principles and practice. Pearson Education.

Marschner, S., Shirley, P. (2018) Fundamentals of Computer Graphics . O'Reilly.

Akenine-Moller, T., Haines, E., & Hoffman, N. (2019). Real-time rendering. AK Peters/crc Press.

[View reading list on Talis Aspire](#)

Interdisciplinary

The mathematical and algorithmic skills developed here can be applied to many other fields in computing, phyics, maths and engineering. For example, the mathematical methods and architecture used in graphics are very similar to those used in machine learning.

Subject specific skills

Mathematical skills and programming skills.

Transferable skills

Technology literacy, adaptability

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (10%)
Tutorials	15 sessions of 1 hour (10%)
Online learning (independent)	10 sessions of 1 hour (7%)
Private study	50 hours (33%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Wider reading around the state of the art in computer graphics.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A1

	Weighting	Study time	Eligible for self-certification
PMA Project	100%	60 hours	Yes (extension)

| **Weighting** | **Study time** | **Eligible for self-certification** |

This is the post module assignment. It is an original programming application in computer graphics with a brief report outlining motivation and solutions.

Feedback on assessment

Written report.

Availability

Pre-requisites

To take this module, you must have passed:

- All of

  - [WM908-15 Programming and Fundamental Algorithms](#)

Post-requisite modules

If you pass this module, you can take:

- WM9M5-15 Games Engine Design and Development
- WM9M4-15 Games Engineering
- WM9M3-15 Advanced Computer Graphics

There is currently no information about the courses for which this module is core or optional.