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|---|---|---|---|
| **MODULE TITLE** | **Computer Graphics** | **CREDIT VALUE** | **15** |
| **MODULE CODE** | **ECM3423** | **MODULE CONVENER** | **Dr Sareh Rowlands (Coordinator)** |

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|---|---|---|---|
| **DURATION: TERM** | **1** | **2** | **3** |
| **DURATION: WEEKS** | **12** | **0** | |

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|---|---|
| **Number of Students Taking Module (anticipated)** | **50** |

## DESCRIPTION - summary of the module content

Much of our interaction with computers is visual and animated. This module introduces you to the modelling and programming of two- and three-dimensional visual scenes using a current graphics API. This module explores the trade-offs that must be made and the algorithms that are used for rendering scenes on graphics hardware.
Pre-requisites: ECM1410, ECM1416

## AIMS - intentions of the module

The aim of this module is to give you a first-hand knowledge of the computer science of modern computer graphics. Specifically, the module will introduce you to the modelling and construction of two- and three-dimensional scenes using a modern graphics API. It will introduce the fundamental ideas and algorithms used in the graphics pipeline for rendering scenes, as well as to straightforward animation techniques.

## INTENDED LEARNING OUTCOMES (ILOs) (see assessment section below for how ILOs will be assessed)

On successful completion of this module, **you should be able to**:

**Module Specific Skills and Knowledge:**
1 Describe the hardware and software elements of a graphics system;
2 Demonstrate a knowledge of output primitives, attributes, object modelling and lighting, and apply them in the context of a particular graphics API;
3 Demonstrate a knowledge of the viewing and rendering pipeline, including the roles of geometrical transformations, raster conversion and clipping;
4 Describe the principal algorithms for two- and three-dimensional rendering on raster devices;
5 Use a graphics API for the production of computer graphics.
**Discipline Specific Skills and Knowledge**:
6 Show an awareness of the effect of hardware constraints on software design;
7 Demonstrate good design and modelling skills.
**Personal and Key Transferable / Employment Skills and Knowledge**:
8 Conduct independent study;
9 Use technical manuals and books to interpret specifications and technical errors.

## SYLLABUS PLAN - summary of the structure and academic content of the module

- introductory material: what is computer graphics? – hardware and software overview;
- graphics pipeline, output primitives, attributes, colour models, raster displays;
- scene building, clipping and viewing;
- geometrical transformations, homogeneous coordinates, perspective and parallel projections;
- parametric representations of lines, curves and surfaces;
- warping and morphing
- raster conversion: drawing lines, filling polygons, depth buffer algorithm;
- rendering: lighting models, camera placement, binocular vision, surface properties;
- animation: key frames, motion paths, kinematics.

# LEARNING AND TEACHING

## LEARNING ACTIVITIES AND TEACHING METHODS (given in hours of study time)

| | | | | | |
|---|---|---|---|---|---|
| **Scheduled Learning & Teaching Activities** | 33.00 | **Guided Independent Study** | 117.00 | **Placement / Study Abroad** | 0.00 |

## DETAILS OF LEARNING ACTIVITIES AND TEACHING METHODS

| Category | Hours of study time | Description |
|---|---|---|
| Scheduled learning and teaching activities | 22 | Lectures |
| Scheduled learning and teaching activities | 11 | Workshops/tutorials |
| Guided independent study | 50 | Coursework |
| Guided independent study | 67 | Reading, programming |

# ASSESSMENT

## FORMATIVE ASSESSMENT - for feedback and development purposes; does not count towards module grade

| Form of Assessment | Size of Assessment (e.g. duration/length) | ILOs Assessed | Feedback Method |
|---|---|---|---|
| Weekly workshops | 5 hours per week | All except 8 | In workshops |

## SUMMATIVE ASSESSMENT (% of credit)

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|---|---|---|---|---|---|
| **Coursework** | 40 | **Written Exams** | 60 | **Practical Exams** | 0 |

## DETAILS OF SUMMATIVE ASSESSMENT

| Form of Assessment | % of Credit | Size of Assessment (e.g. duration/length) | ILOs Assessed | Feedback Method |
|---|---|---|---|---|
| Written exam - closed book | 60 | 2 hours - Summer Exam Period | All except 5, 8 and 9 | Oral, on request. |
| Project | 40 | 50 hours | All, particularly 5 | Written feedback |

## DETAILS OF RE-ASSESSMENT (where required by referral or deferral)

| Original Form of Assessment | Form of Re-assessment | ILOs Re-assessed | Time Scale for Re-reassessment |
|---|---|---|---|

| Original Form of Assessment | Form of Re-assessment | ILOs Re-assessed | Time Scale for Re-reassessment |
|---|---|---|---|
| Written Exam | Written exam (2 hours) | All | August Ref/Def Period |
| Project | Project | All | August Ref/Def Period |

## RE-ASSESSMENT NOTES

Reassessment will be by coursework and/or written exam in the failed or deferred element only. For referred candidates, the module mark will be capped at 40%. For deferred candidates, the module mark will be uncapped.

## RESOURCES

**INDICATIVE LEARNING RESOURCES - The following list is offered as an indication of the type & level of information that you are expected to consult. Further guidance will be provided by the Module Convener**

ELE – http://vle.exeter.ac.uk

Other resources:

**Reading list for this module:**

| Type | Author | Title | Edition | Publisher | Year | ISBN | Search |
|---|---|---|---|---|---|---|---|
| Set | Hearn, D, Baker, P | Computer Graphics | 2nd | Prentice Hall | 1997 | 978-0131615304 | [Library] |
| Extended | Rowe, Glen | Computer Graphics with Java | | Palgrave | 2001 | | [Library] |
| Extended | Knudsen, Jonathan | Java 2D Graphics | | O'Reilly | 1999 | 1565924843 | [Library] |
| Extended | Foley, van Dam, Feiner and Hughes | Computer Graphics: Principles and Practice | | Addison-Wesley | 1995 | | [Library] |

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|---|---|---|---|
| **CREDIT VALUE** | 15 | **ECTS VALUE** | 7.5 |
| **PRE-REQUISITE MODULES** | ECM1410, ECM1416 | | |
| **CO-REQUISITE MODULES** | | | |
| **NQF LEVEL (FHEQ)** | 6 | **AVAILABLE AS DISTANCE LEARNING** | No |
| **ORIGIN DATE** | Tuesday 10 July 2018 | **LAST REVISION DATE** | Monday 11 April 2022 |
| **KEY WORDS SEARCH** | None Defined | | |