



## Module Specification

Key Information			
Module title	3D Graphics and Animation		
Level	6	Credit value	15
Member Institution	Goldsmiths	Notional study hours and duration of course	150
Module lead author/ Subject matter expert	Sylvia Pan		
Module co-author			

Rationale for the module
Software developers use 3D computer graphics and animation in video games, movies, advertisements, virtual reality, training systems, data visualisation and more. Computer graphics is a critical application area for computer science. This module provides a standalone 3D graphics skill set, and it works alongside other modules in the programme to prepare you to develop graphically intensive applications such as video games and virtual reality systems.

Aims of the module
This module will cover advanced methods used in current state-of-the-art graphics and animation systems. It will include the mathematical foundations, computational techniques and their use in creative practice. By taking this module, you will learn how to write programs that generate animated 3D graphics. There are several distinct study areas: 3D modelling and animation, the graphics pipeline, simulation of physics and shader programming. You will study a range of examples, and through these learn how you can program computer graphics in contemporary graphical software for different applications.

## Topics covered in this module:

The topics listed here are an approximation of what will be covered. The topics presented may be slightly revised to ensure currency and relevance. Students will be advised of any changes in advance of their study.

1. Overview of 3D Graphics and mathematics for graphics
2. 3D Models and Transforms
3. Physics simulation
4. Keyframe Animation
5. Character Animation
6. Rendering and the Graphics Pipeline
7. Lighting, Materials and Texturing
8. Shader Programming
9. Vertex Shaders
10. Fragment Shaders

Approximately 10-12 hours of study will be required per topic. The remaining study time is intended for coursework and examination preparation.

## Learning outcomes for the module

Students who successfully complete this module will be able to:

1. Explain the mathematical and theoretical principles of computer graphics and apply them to practical computer graphics problems.
2. Explain many computer graphics and animation techniques used in contemporary graphical software and use them to create computer graphics and animation sequences
3. Develop basic but complete graphics software systems
4. Analyse and evaluate the use of computer graphics methods in practical applications.
5. Apply computer graphics and animation techniques to creating aesthetic effects

## Assessment strategy, assessment methods

### Summative and Formative Assessments

The module will contain a range of summative and formative assessments. Summative assessments are assessments which contribute directly towards your final grade. Formative assessments do not count directly towards your final grade. Instead, they provide you with opportunities for low stakes practice, and will often provide some sort of feedback about your progress. For example, a practice quiz might provide you with feedback about why a particular answer was wrong.

### Assessment Activities

The table below lists the assessment activity types you might encounter taking the module. It also states if that type of assessment can be automatically graded. For example, multiple choice quizzes can be automatically graded, and so can some programming assignments. It also states if that type of assessment will be found in the summative coursework and the summative examination. More details about the summative assessments are provided below.

Assessment activity type	Can it be automatically graded with feedback in some cases?	Coursework	Examination
Quiz	X	X	X
Writing task		X	X
Programming task	X	X	X
Video task		X	
Peer review task		X	

### Pass Mark

In order to pass this module, you must achieve at least 35% in each element of summative assessment and an overall weighted average of 40%, subject to the application of rules for compensation. Please refer to the programme regulations for more information.

### Summative Assessment Elements

As this is a module that has a significant amount of theory it is assessed as a theory-based module. This means that the summative assessment is composed of two elements, whose weightings are listed in the table below.

Summative Assessment Component	Percentage of final credit	Deadline
Coursework	50%	Mid session
Examination	50%	End of session

The coursework comprises a variety of practical exercises and quizzes which in total will take up to 25 hours of study time to complete. The examination will be two hours long, and consist of written answer and multiple choice questions.

## Learning resources

The module will draw on a number of different, largely web-based, public resources as well as the resources produced as bespoke material for this module. The standard text book(s) for the module will be:

*Interactive Computer Graphics: a Top-down approach using OpenGL*. Edward Angel. Pearson International Edition (2009)

*Fundamentals of Computer Graphics*. Peter Shirley et al. AK Peters (2005)

*Foundations of 3D Programming Using JOGL and Java3D*. Jim X. Chen & Chunyang Chen. Springer (2008)

*Parent, Rick. Computer animation: algorithms and techniques*. Newnes, 2012