



## Module Specification

Key Information			
Module title	Graphics Programming		
Level	5	Credit value	15
Member Institution	Goldsmiths	Notional study hours and duration of course	150
Module lead author/ Subject matter expert	Theodoros Papatheodorou		
Module co-author			

Rationale for the module
Computer graphics is a critical application area in computer science. Displaying, processing and generating still and moving images using computational systems is necessary for video games, digital photography and computational art. We interact with computer graphics systems every day. This module builds on some of the programming and mathematical techniques you have seen earlier in the programme and will prepare you for more advanced areas such as virtual reality and image signal processing seen later in the programme.

Aims of the module
This module aims to show you how to work with images in a variety of ways. You will learn how to synthesise graphics and how to process visual signals. You will learn about the mathematical ideas that underpin digital representations of graphics; how digital media files represent graphics, and how to handle and manipulate them; and the basics of working with simulated physics and 3D graphics.

## 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. Introduction to graphics
2. Coordinate transformations
3. Number generators: noise/sine
4. Images, pixels, colors
5. Image processing
6. Computer Vision: introduction
7. Computer Vision: advanced
8. Simulating physical systems
9. 3D graphics
10. Recap and review

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

## Learning outcomes for the module

Learners who successfully complete this module will be able to:

1. Apply filters on images in order to transform them for processing in computer vision scenarios
2. Explain the fundamental tenets of computer vision and write code that processes images to make intelligent assertions about their content
3. Explain the basic mathematical and theoretical principles of visual computing
4. Write basic but complete graphics software systems
5. Manipulate numerical representations of visual media
6. Select and use software libraries for software development

## 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.

The module will include continuous assessments, primarily comprising regular summative quizzes and small programming exercises. There will be a more substantial mid-term programming exercise and a final examination including a number of programming exercises.

### 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 courseworks (CW1, CW2). More details about the summative assessments are provided below.

Assessment activity type	Can it be automatically graded with feedback in some cases?	CW1 + CW2
Quiz	X	X
Writing task		X
Programming task	X	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

This is a module that is best assessed largely through continuous assessment by way of exercises worked on throughout the session.

Summative Assessment Component	Components	Percentage of final credit	Deadline
<b>Coursework 1</b>	Four programming exercise submissions	50%	Mid session
<b>Coursework 2</b>	Four programming exercise submissions	50%	End of session

Each of the two courseworks will take up to 25 hours of study time to complete and comprise a variety of practical exercises and quizzes.

### 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:

3D Math Primer for Graphics and Game Development, Fletcher Dunn, A K Peters/CRC Press, ISBN-10: 1568817231, 2011

Mathematics for Computer Graphics (Undergraduate Topics in Computer Science), John Vince, Springer, ISBN-10: 1447162897, 2014