<table>
<thead>
<tr>
<th><strong>Module Code</strong></th>
<th>CS7GV3</th>
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<tbody>
<tr>
<td><strong>Module Name</strong></td>
<td>Real-time Rendering</td>
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<td><strong>ECTS weighting</strong></td>
<td>5</td>
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<td><strong>Term</strong></td>
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<tr>
<td><strong>Contact Hours</strong></td>
<td>2 lecture hours per week</td>
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<tr>
<td><strong>Module Personnel</strong></td>
<td>Assistant Professor John Dingliana</td>
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**Learning Outcomes**

On successful completion of this module, students will be able to:
- GV3LO1 explain the differences between fixed function graphics pipelines and shader architectures, including pixel, vertex and geometry shaders.
- GV3LO2 architect a shader pipeline in a game context.
- GV3LO3 develop specific shaders to implement lighting models, shadowing, geometry processing and post-processing effects.
- GV3LO4 analyse and compare different approaches to real-time rendering
- GV3LO5 discuss state-of-the-art issues in real-time rendering

**Module Learning Aims**

This module deals with programming for GPU pipeline architectures e.g. geometry, rasterisation, texturing, fragment / pixel and vertex shaders. Students will be introduced to shader systems and shader coding and will learn about modern game graphics engine architectures and developing real-time graphics applications, both for desktop PC and Xbox360. The module will explore advanced rendering concepts presented at leading international conferences such as SIGGRAPH and GDC.

**Module Content**

1. Overview of graphics pipeline
2. Introduction to GPUs
3. Introduction to shader / stream programming using GLSL
4. Illumination/ Surface models (Phong, Blinn, normal maps etc.)
5. Shadowing Techniques (shadow maps, volumes etc.)
6. Global Illumination (reflection, refraction etc.)
7. Stylised and Non-photorealistic Rendering
8. Voxel rendering

**Recommended Reading List**

Various research papers from SIGGRAPH
Excerpts from GPU PRO, GPU Gems, Graphics Gems series of books

**Assessment Details**

Coursework: 100%

Coursework will consist of labs 50% and a project 50%.