### School of Computer Science and Statistics
**ECTS Module Descriptor 2011-12**

<table>
<thead>
<tr>
<th>Academic Year</th>
<th>2011-12</th>
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<tbody>
<tr>
<td>Module Code</td>
<td>CS7055</td>
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<tr>
<td>Module Title</td>
<td>Real-time Rendering</td>
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<tr>
<td>Pre-requisites</td>
<td>Module CS7031</td>
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<td>ECTS</td>
<td>5</td>
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<tr>
<td>Chief Examiner</td>
<td>Dr. John Dingliana</td>
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<tr>
<td>Teaching Staff</td>
<td>Dr. John Dingliana</td>
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<td>Delivery</td>
<td>1 Semester;  3 lectures &amp; 1 lab per week</td>
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#### 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.

#### Learning Outcomes
On successful completion of this module, students will be able to:
- Explain the differences between fixed function graphics pipelines and shader architectures, including pixel, vertex and geometry shaders.
- Architect a shader pipeline in a game context.
- Develop specific shaders to implement lighting models, shadowing, geometry processing and post-processing effects.

#### Syllabus
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

#### Assessment
100% by coursework. Labs 50%, Project 50%.

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

#### Website
http://www.scss.tcd.ie/John.Dingliana/cs7055