Module Code | CS7GV3
---|---
Module Name | Real-time Rendering
ECTS Weighting | 5 ECTS
Semester taught | Semester 2
Module Coordinator/s | Assistant Professor Michael Manzke

Module Learning Outcomes
On successful completion of this module, students will be able to:

- **LO1.** explain the differences between fixed function graphics pipelines and shader architectures, including pixel, vertex and geometry shaders.
- **LO2.** architect a shader pipeline.
- **LO3.** develop specific shaders to implement lighting models, shadowing, geometry processing and post-processing effects.
- **LO4.** analyse and compare different approaches to real-time rendering.
- **LO5.** discuss state-of-the-art issues in real-time rendering.

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

Teaching and Learning Methods
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 architectures and developing real-time graphics applications for desktop PC. The module will explore advanced rendering concepts presented at leading international conferences such as SIGGRAPH and GDC.

Assessment Details

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Brief Description</th>
<th>Learning Outcomes Addressed</th>
<th>% of total</th>
<th>Week set</th>
<th>Week due</th>
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<tbody>
<tr>
<td>Coursework Labs</td>
<td></td>
<td>LO1, LO2, LO3, LO4, LO5</td>
<td>50%</td>
<td>1</td>
<td>6</td>
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<tr>
<td>Coursework Project</td>
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<td>LO1, LO2, LO3, LO4, LO5</td>
<td>50%</td>
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<td>12</td>
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1. [TEP Glossary](#)
2. [TEP Guidelines on Workload and Assessment](#)
### Reassessment Details
Examination (2 hours, 100%)

### Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>22 hours</th>
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<tr>
<td>lecture</td>
<td>11 hours</td>
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<tr>
<td>laboratory</td>
<td>11 hours</td>
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<tr>
<td>tutorial or seminar</td>
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<td>other</td>
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<table>
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<tr>
<th>Independent study (outside scheduled contact hours), broken down by:</th>
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<tr>
<td>preparation for classes and review of material (including preparation for examination, if applicable)</td>
<td>40 hours</td>
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<tr>
<td>completion of assessments (including examination, if applicable)</td>
<td>63 hours</td>
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| Total Hours | 125 hours |

### Recommended Reading List
Various research papers from SIGGRAPH
Excerpts from GPU PRO, GPU Gems, Graphics Gems series of books

### Module Pre-requisites
C++ and OpenGL

### Module Co-requisites

### Module Website
Blackboard

### Last Update
26/09/2019 by Prof. M. Manzke