Computer Graphics (COMP0027)

**Description**

**Aims:**
To introduce the fundamental concepts of 3D computer graphics and give the students all the knowledge needed for creating an image of a virtual world from first principles.

**Learning outcomes:**
On successful completion of the module, a student will be able to:
1. define a virtual world and create images of it;
2. write a basic ray tracer, and use a graphics library such as OpenGL (or equivalent);

**Content:**
Introduction:
- The painters method;

Creating an image using ray tracing:
- Ray casting using a simple camera;
- Local illumination;
- Global illumination with recursive ray tracing;

Specifying a general camera:
- World / image coordinates;
- Creation of an arbitrary camera;
- Ray tracing with an arbitrary camera;

Constructing a scene:
- Scene hierarchy;
- Transformations of objects / rays;
- Other modelling techniques;

Acceleration Techniques:
- Bounding volumes;
- Space subdivision;

From ray tracing to projecting polygons:
- Graphics pipeline;
- Transforming the polygons to image space;
- Sutherland Hodgman clipping;

**Key information**

<table>
<thead>
<tr>
<th>Year</th>
<th>2019/20</th>
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<tbody>
<tr>
<td>Credit value</td>
<td>15 (150 study hours)</td>
</tr>
<tr>
<td>Delivery</td>
<td>UG L6, Campus-based</td>
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<td>Reading List</td>
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<td>Tutor</td>
<td>Dr Tobias Ritschel</td>
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<td>Term</td>
<td>Term 1</td>
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**Assessment**

For more information about the department, programmes, relevant open days and to browse other modules, visit [ucl.ac.uk](http://ucl.ac.uk)

**Disclaimer:** All information correct as of June 2019. Please note that aspects of the module may be subject to change. UCL will make best efforts to inform applicants of major changes.
- Scan conversion;
- Z-buffer;
- Interpolated shading;
- Texture mapping;
- Back face culling;

Shadows:
- Shadow volumes;
- Shadow buffer;
- Shadow mapping;
- Soft shadows;

The nature of light:
- Transport theory, Radiance, luminance, radiosity;
- The radiance equation;
- Photon mapping;
- Monte Carlo integration;

Parametric surfaces:
- Bezier Curves;
- B-Splines Curves;

Requisites:
In order to be eligible to select this module, a student must be registered on a programme for which it is a formally-approved option or elective choice AND must have EITHER (i) passed BSc/MEng Computer Science (Years 1 and 2) at UCL; OR (ii) passed MEng Mathematical Computation (Years 1 and 2) at UCL.
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Key information

Year: 2019/20
Credit value: 15 (150 study hours)
Delivery: PGT L7, Campus-based
Reading List: View on UCL website
Tutor: Dr Tobias Ritschel
Term: Term 1
Timetable: View on UCL website

Assessment

- Written examination (main exam period): 75%
- Coursework: 25%

Find out more

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