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**

**Year** 2019/20  
**Credit value** 15 (150 study hours)  
**Delivery** UG L6, Campus-based  
**Reading List** [View on UCL website]  
**Tutor** Dr Tobias Ritschel  
**Term** Term 1  
**Timetable** [View on UCL website]

**Assessment**

**Find out more**

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%

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