<table>
<thead>
<tr>
<th>Module Code</th>
<th>CS7029</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module Name</td>
<td>Visual Computing and Design 1+2</td>
</tr>
<tr>
<td>ECTS Weighting&lt;sup&gt;1&lt;/sup&gt;</td>
<td>10 ECTS</td>
</tr>
<tr>
<td>Semester taught</td>
<td>Semester 1 &amp; 2</td>
</tr>
<tr>
<td>Module Coordinator/s</td>
<td>Kerstin Ruhland and Robin Fuller</td>
</tr>
</tbody>
</table>

### Module Learning Outcomes

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

- **LO1.** Identify key formal elements in graphic design processes and practices
- **LO2.** Analyse graphic design and visual cultural products in an informed and structured manner
- **LO3.** Evaluate these products in terms of formal (i.e. functional) success and socio-cultural & technological relevance
- **LO4.** Identify some of the key theoretical principles, standard algorithms and data structures underlying modern graphical applications.
- **LO5.** Discuss how fundamental components common to all computer applications are used to produce high-level computer imagery in digital media and interactive graphical programs.
- **LO6.** Employ industry-standard computer-aided design software to create 3D objects and models, modify a virtual camera, animate and render images and videos of complex virtual scene.
- **LO7.** Write computer programs for modifying computer images and generating graphical objects in 2D and 3D
- **LO8.** Implement an interactive computer application, that handles input events from the user (such as mouse, keyboard input) to affect graphical output
- **LO9.** Implement a basic virtual reality application.

### Module Content

**Graphic Design (Robin Fuller)**

- Information Design
- Typography
- Non-linguistic visual communication
- Text and image interaction

**Image Processing and 3D Modelling (John Dingliana, Kerstin Ruhland)**

The objective of this module is to equip students with a fundamental understanding of the technology underlying the field of computer images and how this is applied to advanced areas such as geometric modelling, rendering and animation. The module will explore modes of input and output and the limitations and potentials of (graphical) digital media. In particular, the module gives an introduction to computer graphics and applications, how digital images are represented, manipulated, enhanced, filtered and displayed. Furthermore, the creation of 3D models and scenes, texture mapping, the use of illumination and lighting, camera modelling and animation are discussed. The second semester will extend on this knowledge by programming interactive 3D Graphics, image and video processing,

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<sup>1</sup> TEP Glossary
procedural graphics and mixed reality. Practical components involving labs will use the following applications: 3D Studio Max, Processing.

**Teaching and Learning Methods**

**Graphic design (Robin Fuller)**

Sessions will alternate between lecture/seminar and lab formats. Lectures will introduce the key issues, leading theorists and visual trends in each topic (information design, typography, text-image interaction, non-linguistic visual communication). The focus will be on teaching fundamental principles of graphic design and design thinking that can be applied in multiple contexts. Introductory instruction on core Adobe CC software (Illustrator, Photoshop, InDesign) will be provided.

**Image Processing and 3D Modelling (John Dingliana, Kerstin Ruhland)**

Through discussion and practical assignments, the module provides an understanding of the production processes, complexity, tools and challenges involved in production of digital images, animations and interactive graphical experiences, including games, virtual reality and augmented reality.

**Semester 1** deals with 3D Graphics and Modelling and consists of one hour per week of lectures or labs. Assignments will involve creation of models, images and animations using industry standard tools, such as 3D Studio Max or Maya.

**Semester 2** deals with Image Processing and Interactive Graphics and consists of three hours per week of lectures and labs. Assignments will involve graphical programming using languages such as Processing.

**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>
</tr>
</thead>
<tbody>
<tr>
<td>e.g. Examination</td>
<td>e.g. 2 hour written examination</td>
<td>e.g. LO1, LO2, LO3, LO4, LO5</td>
<td>80%</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>e.g. Essay</td>
<td>Mid-Term Assignment</td>
<td>e.g. LO5, LO6</td>
<td>20%</td>
<td>6</td>
<td>8</td>
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**Image Processing and 3D Modelling (John Dingliana, Kerstin Ruhland)**

<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>
</tr>
</thead>
<tbody>
<tr>
<td>Essay</td>
<td>Introduction to visual computing</td>
<td>LO1</td>
<td>2%</td>
<td>3</td>
<td>4</td>
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<tr>
<td>Practical</td>
<td>Model a complete 3D Scene</td>
<td>LO1, LO2, LO3</td>
<td>38%</td>
<td>8</td>
<td>22</td>
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<tr>
<td>Practical</td>
<td>Introduction to Processing</td>
<td>LO4, LO5</td>
<td>2%</td>
<td>22</td>
<td>23</td>
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<tr>
<td>Practical</td>
<td>Interactive Graphics</td>
<td>LO4, LO5</td>
<td>3%</td>
<td>23</td>
<td>24</td>
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<tr>
<td>Practical</td>
<td>Image Processing</td>
<td>LO4, LO5</td>
<td>5%</td>
<td>24</td>
<td>25</td>
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<tr>
<td>Practical</td>
<td>Image Stylisation</td>
<td>LO4, LO5</td>
<td>5%</td>
<td>25</td>
<td>26</td>
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2 TEP Guidelines on Workload and Assessment
### Practical Video Processing
L04, L05 3% 26 27

### Practical Mid-Term Assignment
L04, L05 20% 27 29

### Practical Interactive 3D Graphics
L04, L05 2% 29 30

### Practical Procedural Graphics
L04, L05 5% 30 31

### Practical Mobile Processing
L04, L05 5% 31 32

### Practical Mixed Reality
L04, L05 10% 32 34

### Reassessment Details
N/A

### Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>66hours</th>
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<tbody>
<tr>
<td>Semester 1: Graphic Design Lectures</td>
<td>22 hours</td>
</tr>
<tr>
<td>Semester 1: Image Processing and 3D Modelling</td>
<td>11 hours</td>
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<tr>
<td>Semester 2: Image Processing and 3D Modelling</td>
<td>33 hours</td>
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<table>
<thead>
<tr>
<th>Independent study (outside scheduled contact hours), broken down by:</th>
<th>72 hours</th>
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<tbody>
<tr>
<td>preparation for classes and review of material</td>
<td>36 hours/10 hours</td>
</tr>
<tr>
<td>(including preparation for examination, if applicable)</td>
<td></td>
</tr>
<tr>
<td>completion of assessments (including examination, if applicable)</td>
<td>36 hours/20 hours</td>
</tr>
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| Total Hours                                                          | 116 hours |

### Recommended Reading List

**Graphic Design (Robin Fuller)**

*Graphic design practice*


*Critical theory, visual studies and semiotics*


**Design theory and criticism**


• Warde, Beatrice. ‘The Crystal Goblin’. 1932. (Heavily anthologised and easily located online).

**Graphic design history**


**Information Design**


**Image Processing and 3D Modelling (Kerstin Ruhland)**

The module is not based on a single textbook. The following are recommended readings. Note that the texts are somewhat overlapped in scope.

• The Computer in the Visual Arts. Anne Morgan Spalter.

- Processing: Creative Coding and Computational Art – I. Greenberg
- *The following are roughly equivalent alternatives:*

<table>
<thead>
<tr>
<th>Module Pre-requisites</th>
<th>Prerequisite modules: None</th>
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<tr>
<td></td>
<td>Other/alternative non-module prerequisites: N/A</td>
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<td>Module Co-requisites</td>
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<td>Module Website</td>
<td><a href="https://scss.tcd.ie/postgraduate/interactive-digital-media/">https://scss.tcd.ie/postgraduate/interactive-digital-media/</a></td>
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<tr>
<td>Last Update</td>
<td>26/08/2019 by Mads Haahr</td>
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