

## MODULE SPECIFICATION

<b>Name of Module</b>		Computer Graphics					
<b>Parent School/Dept</b>		Computer Science					
<b>Programme(s) where module is offered</b>		BSc Computer Science with Electrical Engineering; BSc Computer Science with Economics; BSc Computer Science with Business; BSc Computer Science with International Relations; BSc Computer Science with Political Science;					
<b>Status</b> (core, option, free choice)		Core		<b>Pre-Requisite Modules or Qualifications</b>		None	
<b>FHEQ Level</b>	6	<b>Unit Value</b>	6 ECTS	<b>Module Code</b>	CS470	<b>Module coordinator</b>	Dr. Belma Ramic-Brkic
<b>Term taught</b>		Fall		<b>Applicable From</b>		2016	

### Educational Aims of the Module

This module aims to develop skills in computer graphics and provide an understanding of the issues involved in creating and displaying images on a computer. Students will learn advanced computer modeling and animation skills using Cinema 4D software. They will also be involved in game design and development through the use of available game engine.

### Module Outline/Syllabus

- Rasterisation pipeline
- Transformations
- 3D object representations
- Texture mapping
- Ray tracing
- Global illumination
- Colours
- Reflection models (shading)
- Shaders
- Image based rendering / lighting
- Animation
- Game design and development
- Game engines
- Visual perception
- Virtual environments (Cultural heritage)

### Student Engagement Hours

Type	Number per Term	Duration	Total Time
Lectures	30	2 hours	60 hours
Laboratory sessions	15	2 hours	30 hours
Total Guided/Independent Learning Hours			<b>60</b>
Total Contact Hours			<b>90</b>
<b>Total Engagement Hours</b>			<b>150</b>

### Assessment Method Summary

Type	Number Required	Duration / Length	Weighting	Timing/Submission Deadline
Final Exam	1	180 minutes	50%	End of semester
Mid-term Exam	1	90 minutes	20%	Week 8
Project (Group)	1	2,000 words	20%	Week 13
Quiz	2	60 minutes	10%	Week 4 and week 13

**Module Outcomes**

<p><b><u>Intended Learning Outcomes:</u></b></p> <ol style="list-style-type: none"> <li>1. Design and create detailed computer models and graphic applications</li> <li>2. Understand and evaluate the principles of manipulating and rendering images</li> <li>3. Design a 3D game using one of the available engines.</li> </ol>	<p align="center">→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ul style="list-style-type: none"> <li>• Interactive lectures on module material. (ILO: 1 -3)</li> <li>• Tutorials provide series of development exercises and solutions to illustrate the theory. (ILO: 1-3)</li> <li>• Group project work enables students to develop research skills and apply the gained knowledge on a concrete problem through conducting research, analysing and presenting the data and project results. (ILO: 1-3)</li> </ul>
		<p align="center">→</p>
<p><b><u>Practical Skills</u></b></p> <ol style="list-style-type: none"> <li>1. Practical understanding of how to create complex 3D models on a computer</li> <li>2. Practical understanding on how to animate objects with physical attributes</li> <li>3. Game design theory and practise</li> <li>4. Use of graphics tools (e.g., Cinema 4D, Unity.)</li> </ol>	<p align="center">→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ul style="list-style-type: none"> <li>• Interactive lectures(PS:1-4)</li> <li>• Laboratory sessions with tutor-lead support (PS:1-4)</li> <li>• Project (PS:1-4)</li> </ul>
		<p align="center">→</p>
<p><b><u>Transferable Skills</u></b></p> <ol style="list-style-type: none"> <li>1. IT Skills</li> <li>2. Team work: ability to collaborate and solve problems in team projects.</li> <li>3. Research Report Writing</li> <li>4. Presentation Skills</li> <li>5. Commercial awareness</li> </ol>	<p align="center">→</p>	<p><b><u>Teaching and Learning Strategy:</u></b></p> <ul style="list-style-type: none"> <li>• Laboratory sessions (TS:1 -2)</li> <li>• Lectures (TS: 1, 3, 5)</li> <li>• Project (TS:1-5)</li> </ul>
	<p align="center">→</p>	<p><b><u>Assessment Strategy</u></b></p> <ol style="list-style-type: none"> <li>1. Project (TS:1-5)</li> </ol>

## Key Texts and/or other learning materials

### Set Text

- P. Shirley, S. Marschner et al., 2015 Fundamentals of Computer Graphics (4<sup>th</sup> Edition), A K Peters/ CRC Press

### Supplementary Materials

- Hughes J.F., Van Dam A., Mcguire M., Sklar D., Foley J.D., Feiner S.K. and Akeley K., 2013, Computer Graphics Principles and Practice (3<sup>rd</sup> Edition), Addison-Wesley.
- Alan Watt., 1999, 3D Computer Graphics (3rd Edition), Pearson
- James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes., 2003, Computer Graphics: Principles and Practice in C 2<sup>nd</sup> Edition, Pearson
- Akenine-Moller, T., Haines, E., 2008, Real-time rendering 3<sup>rd</sup> Edition, A K Peters Ltd.
- Pharr, M., 2010, Physically Based Rendering, 2<sup>nd</sup> Edition, Morgan Kaufmann
- Reinhard, Ward, Pattanaik, Debevec, 2010, High Dynamic Range Imaging, 2<sup>nd</sup> Edition, Morgan Kaufmann
- R. Brinkmann, 2008, The Art and Science of Digital Compositing, 2<sup>nd</sup> Edition, Morgan Kaufman S.Govil-Pai, 2005, Principles of Computer Graphics, Springer
- Edwards, B., 2013, Drawing on the right side of the brain, 4<sup>th</sup> Edition, Souvebir Press Ltd

**Please note:** This specification provides a concise summary of the main features of the module and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each module and programme can be found in the departmental or programme handbook. The accuracy of the information contained in this document is reviewed annually by the University of Buckingham and may be checked by the Quality Assurance Agency.

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