

Liverpool John Moores University

Title: CREATIVE VISUALISATION
Status: Definitive
Code: **6526YCOM** (118260)
Version Start Date: 01-08-2012

Owning School/Faculty: Computing and Mathematical Sciences
Teaching School/Faculty: Kolej Teknologi YPC-ITWEB

Team	Leader
Sud Sudirman	Y
Chris Carter	

Academic Level: FHEQ6 **Credit Value:** 24.00 **Total Delivered Hours:** 72.00
Total Learning Hours: 240 **Private Study:** 168

Delivery Options

Course typically offered: Standard Year Long

Component	Contact Hours
Lecture	24.000
Workshop	48.000

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Technology	AS1	Creative visualisation of complex data.	50.0	
Technology	AS2	Visualisation Enhancement through GPU Processing	50.0	

Aims

To develop a theoretical knowledge of the concepts and techniques required for visualisation of data and information.

To provide an opportunity to design and develop a visualisation solution for a given data domain using appropriate tools, techniques and methods.

To explain the use of visual data and resources within 3D visualisation environments.

To develop theoretical and practical knowledge of GPU-based processing techniques for 3D visualisation enhancement.

Learning Outcomes

After completing the module the student should be able to:

- 1 Discuss key concepts and techniques in the field of data and information visualisation.
- 2 Critically evaluate visualisation designs and recommend necessary improvement.
- 3 Design and develop effective visualisation solutions for a given problem and data domain.
- 4 Describe and critically evaluate techniques for visualisation enhancement in real-time 3D environments.
- 5 Practically apply GPU-based processing for the purpose of visualisation enhancement.

Learning Outcomes of Assessments

The assessment item list is assessed via the learning outcomes listed:

Creative visualisation	1	2	3
Visualisation Enhancement	4	5	

Outline Syllabus

Visualisation: Background, application, importance and technology.

Data & Information Representation: Data type, statistical data, time series data, data format etc.

Principles of Graphic Design: Colour, alignment, balance, consistency, contrast, proximity, gestalt etc.

Type of Visualisation: Data visualisation, information visualisation, concept visualisation, strategy

Visualisation Development: Visualisation design, interaction design, data acquisition, data interpretation (parsing) visualisation development – programming, testing and deployment.

Introduction to Rasterisation for real-time 3D visualisation.

Introduction to 3D Data Representation and Resource Usage.

Introduction to GPU-based Processing.

Introduction to Shader-based GPU Processing (HLSL)

Balancing CPU and GPU-based processing

Modern Visualisation Rendering – Global vs. Local Illumination.

Hardware Texturing and Lighting.

Data Mapping using GPU Processing

GPU Visual Effect Processing

Non-Photo Realistic Rendering.

Post Processing Techniques (Render Targets, Deferred Rendering and Post Processing FX).

Learning Activities

Formal lectures will deliver theoretical concepts, whilst practical computer laboratory-based workshop sessions will be used to introduce specific methods, techniques and tools used in the design and development of a visualisation solution, in both 2D and 3D environments.

References

Course Material	Book
Author	Telea, A. C.
Publishing Year	2007
Title	Data visualization
Subtitle	Principles and practice
Edition	
Publisher	AK Peters
ISBN	1568813066

Course Material	Book
Author	Ware, C.
Publishing Year	2004
Title	Information visualization
Subtitle	Perception for design
Edition	
Publisher	Morgan Kaufmann
ISBN	1558608192

Course Material	Book
Author	Akenine-Moller T., Haines E., Hoffman N.
Publishing Year	2008
Title	Real-Time Rendering
Subtitle	
Edition	3rd
Publisher	AK Peters
ISBN	1568814240

Course Material	Book
Author	Shirley P., Marschner S.
Publishing Year	2009
Title	Fundamentals of Computer Graphics
Subtitle	
Edition	3rd

Publisher	AK Peters
ISBN	1568814690

Notes

This module teaches students the process of visualisation and information. The goal of data visualisation is to use images and visual cues to improve our understanding of a dataset, drawing on techniques from computer science, mathematics, cognitive and perception science and physics. Students will also learn the importance of GPU based Processing and the creative manipulation of buffers, streams and textures to enhance the visual representation of a 3D visualisation environment.