

Liverpool John Moores University

Title: Computer Graphics and Visualisation
Status: Definitive
Code: **6220COMP** (128019)
Version Start Date: 01-08-2021

Owning School/Faculty: Computer Science and Mathematics
Teaching School/Faculty: Computer Science and Mathematics

Team	Leader
Hoshang Kolivand	Y
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Academic Level: FHEQ6 **Credit Value:** 20 **Total Delivered Hours:** 44
Total Learning Hours: 200 **Private Study:** 156

Delivery Options

Course typically offered: Semester 2

Component	Contact Hours
Lecture	33
Practical	11

Grading Basis: 40 %

Assessment Details

Category	Short Description	Description	Weighting (%)	Exam Duration
Report	AS1	Investigation and research on visualisation	50	
Artefacts	AS2	Interactive graphical application for data visualisation	50	

Aims

*To use computer Graphic techniques to develop data and information visualization
To introduce the theoretical concepts of graphical display, both 2D and 3D, leading to the practical development of visualisation solutions using relevant tools and techniques.*

Learning Outcomes

After completing the module the student should be able to:

- 1 Critically relate communication requirements to real-time visual graphics.
- 2 Critically analyse graphics used in interactive data visualization.
- 3 Apply key concepts in graphical representation on display devices.
- 4 Evaluate solutions for data and information visualization.

Learning Outcomes of Assessments

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

Visualisation Research	1	2
Application	3	4

Outline Syllabus

Introduction to the application of visualisation and the associated technologies

Data Abstraction; data types, statistical data, time series data, etc.

Principles of graphics and viewing: Colour, alignment, balance, consistency, contrast, proximity, camera positioning, etc.

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

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

Principles of geometric objects and transformations, 2D and 3D coordinate systems. vectors, matrices and basic vector/matrix operations.

Coordinate Spaces, Euclidean Space vs Vector Space.

Introduction to 3D Data Representation and Resource Usage.

Polygonal representations of manifolds and functions.

Raster vs Vector Graphics Introduction to Rasterisation for real-time 3D visualisation.

Pipelined Transformation through the Coordinate Spaces: Local -> Model -> Eye -> H.Clip -> Screen Vertex Operations

Pixel Operations.

Hidden surface removal

2D and 3D Visualisation in Virtual; Reality and Augmented Reality

The role of Visualisation in 21st century

Learning Activities

Formal lectures will be complemented by hands-on practical laboratory sessions.

Notes

Massive amounts of data are being generated by modern digital systems; there is a demand for rapid and effective analysis and communication of the relevant data. This module covers topics related to interpreting and displaying data for visualisation and techniques to present various types of data in appropriate formats.