

**Course Code:**

TBC

**1. Course Title:**

Volumetric and 3D Surface Visualisation

**2. Academic Session:**

2011/12

**3. Level:**

SCQF 11

**4. Credits:**

15

**5. Lead School/Board of Studies:**

Digital Design Studio

**6. Course Contact:**

Dr. Kim Bale

**7. Course Aims:**

This course aims to provide an evolving up-to-date snapshot of leading edge visualisation methodologies and techniques, e.g. volume and surface visualisation, acquisition and visualisation systems, and visualisation of medical volumetric data in MRI, CT, and ultrasound scan. The course will emphasise a practical approach, through course assignments.

**8. Intended Learning Outcomes of Course:**

On successful completion of the module the student will be able to:

1. demonstrate a critical understanding and knowledge of volumetric data, surface data, principal techniques for visualising volumetric data, and their relation to medical visualisation;
2. use visualisation software to create 3D medical models from volumetric data;
3. demonstrate self-direction through the development and management of a project of research.

**9. Indicative Content:**

Lecture subjects are likely to cover the following:

- Voxel data vs. polygon data
- Techniques for visualizing volumetric data (surface extraction, volume rendering)
- The concepts behind medical volumetric data, e.g. MRI, CT, and ultrasound data
- Using professional volume visualisation software, e.g. Amira
- Defining transfer functions for transparency, X-rays, CT, MRI, PET scans, virtual endoscopy
- Laser scanning techniques
- Resolution, application, data handling, data processing, surfacing, modelling applications

**10. Description of Summative Assessment:**

For this course, students will be assessed through a written examination and a coursework.

Examination weighting: 60%

The learning outcome 1 will be assessed through a close-book written examination.

Coursework weighting: 40%

Students will be assessed through an individual project to demonstrate competency in the use of professional medical visualisation software and apply knowledge and understanding of key volumetric visualisation techniques.

**10.1 Please describe the Summative Assessment arrangements:**

Students on this course will be assessed on their ability to:

- demonstrate a detailed and informed grasp of the concepts of volumetric data, principal techniques for visualising volumetric data, and their use in developing sophisticated medical visualisation systems;
- show an understanding of the practice and theory contexts in relation to which their project is positioned;
- produce 3D medical visualisation from volume data using professional tools;
- demonstrate an understanding of the detailed processes involved in visualising medical data;
- demonstrate ability to structure tasks and overall workload.

**11. Formative Assessment:**

N/A

**11.1 Please describe the Formative Assessment arrangements:**

N/A

**12. Collaborative:**

Yes

No

**12.1 Teaching Institutions:**

The University of Glasgow

**13. Requirements of Entry:**

None

**14. Co-requisites:**

None

**15. Associated Programmes:**

MSc Medical Visualisation and Human Anatomy

**16. When Taught:**

Stage 1

**17. Timetable:**

Timetable will be available in the induction week.

**18. Available to Visiting Students:**Yes No **19. Distance Learning:**Yes No **20. Placement:**Yes No **21. Learning and Teaching Methods:**

Method	Formal Contact Hours	Notional Learning Hours (Including formal contact hours)
Lecture	10	50
Studio		
Seminar/Presentation		
Tutorial	18	90
Workshop		
Laboratory work		
Project work		
Professional Practice		
E-Learning / Distance Learning		
Placement		
Examination	2	10
Essay		
Private Study	Not Applicable	
Other (please specify below)		
<b>TOTAL</b>	<b>30</b>	<b>150</b>

**22. Description of "Other" Teaching and Learning Methods:**

N/A

**23. Additional Relevant Information:**

Volumetric data are frequently used in the visualisation and analysis of medical data. Two types of rendering methods, surface rendering and volume rendering, are used to reconstruct 3D medical models from original data.

This course is intended to provide students with an introduction to volumetric data, techniques for visualising volumetric data, and their applications in medical imaging and visualisation, e.g. MRI, CT, and ultrasound data. The course also provides the student with the necessary skills to use commercial medical visualisation software and tools to demonstrate a critical understanding of the theories and concepts.

**24. Indicative Bibliography:**

N/A