

Course Code:

PMVS104

Session:

2017/18

1. Course Title:

Volumetric Visualisation

2. Date of Production/Revision:

9/03/2017

3. Level:

SCQF 11

4. Credits:

15

5. Lead School/Board of Studies:

School of Simulation and Visualisation

6. Course Contact:

Dr Matthieu Poyade

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, PET and X-Ray 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:

This course will cover issues including

- 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. 3D Slicer
- Defining transfer functions for transparency, X-rays, CT, MRI, PET scans, virtual endoscopy
- Resolution, application, data handling, data processing, surfacing, modelling applications

10. Description of Summative Assessment:

| No. | Assessment Method | Description of Assessment Method | Weight % | Submission week (assignments) or length (exam) |
|-----|-------------------|--|----------|--|
| 1 | Coursework | Series of 3D Visualisations of medical scan data produced using professional medical visualisation software with reflective commentary | 100 | Week 12 (indicative) |
| 2 | | | | |

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:

Individual feedback is available during tutorials to provide formative assessment.

11.1 Please describe the Formative Assessment arrangements:**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 | 10 |
| Studio | | |
| Seminar/Presentation | | |
| Tutorial | | |
| Workshop | | |
| Laboratory work | 18 | 38 |
| Project work | 2 | 50 |
| Professional Practice | | |
| E-Learning / Distance Learning | | |
| Examination | | |
| Essay | | |
| Private Study | Not Applicable | 52 |
| Other (please specify below) | | |
| TOTAL | 30 | 150 |

| |
|--|
| 22. Description of “Other” Teaching and Learning Methods: |
| |

| |
|--|
| 23. Additional Relevant Information: |
| <p>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.</p> <p>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, PET and X-Ray data. The course also provides students with the necessary skills to use medical visualisation software and tools to demonstrate a critical understanding of the theories and concepts.</p> |

| |
|---|
| 24. Indicative Bibliography: |
| <p>Berhard Preim, Dirk Bartz (2007) Visualisation in medicine: theory, algorithms, and applications, Morgan Kaufmann Publishers Inc. ISBN 9780080549057</p> |