



GEOS708

Scientific Visualisation and Scripting

S2 Day 2017

Dept of Earth and Planetary Sciences

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General Information

Unit convenor and teaching staff

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Credit points

4

Prerequisites

Admission to MRes

Corequisites

Co-badged status

Unit description

This unit is a hands-on tutorial-style unit, where students will work with some of the most sophisticated scientific visualization programs developed, and learn how to manipulate, process, and display large and disparate geoscience datasets. Topics covered include an introduction to the Unix shell, developing maps with generic mapping tools, handling and rendering digital elevation data in Terragen, developing a practical understanding of rendering and animation using Blender, and managing and processing large datasets using python, and visualising the output using python tools SciLab, MatlabPlot, and Paraview. Students will be required to complete four small assignments on each of the modules (Shell and GMT, Terragen, Blender, and Python). Students will also present a major assignment on one of two given topics (Blender or Terragen), and complete an in-house processing exercise.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at <https://www.mq.edu.au/study/calendar-of-dates>

Learning Outcomes

On successful completion of this unit, you will be able to:

1. understanding the fundamentals of scientific data structure
2. understanding of how to manipulate and process batch data
3. understanding of the fundamentals of visualisation of scientific datasets
4. understanding scientific methodology

5. competence in accessing, using and synthesising appropriate information
6. application of knowledge to solving problems and evaluating ideas and information
7. capacity to present ideas clearly with supporting evidence

Assessment Tasks

Name	Weighting	Hurdle	Due
Assignment I	10%	No	1/9/2017
Assignment II	10%	No	1/9/2017
Assignment III	10%	No	20/9/2017
Assignment IV	10%	No	31/10/2017
Major Assignment V	40%	No	Week 13
Take home exam	20%	No	Week 13

Assignment I

Due: **1/9/2017**

Weighting: **10%**

Assignment I on GMT tutorial

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 5. competence in accessing, using and synthesising appropriate information

Assignment II

Due: **1/9/2017**

Weighting: **10%**

Assignment II on Terragen tutorials

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets

- 5. competence in accessing, using and synthesising appropriate information

Assignment III

Due: **20/9/2017**

Weighting: **10%**

Assignment III on blender tutorials

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 5. competence in accessing, using and synthesising appropriate information

Assignment IV

Due: **31/10/2017**

Weighting: **10%**

Assignment IV on python module

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information

Major Assignment V

Due: **Week 13**

Weighting: **40%**

Major research assignment

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information
- 6. application of knowledge to solving problems and evaluating ideas and information

- 7. capacity to present ideas clearly with supporting evidence

Take home exam

Due: **Week 13**

Weighting: **20%**

Take home exam

On successful completion you will be able to:

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information
- 6. application of knowledge to solving problems and evaluating ideas and information
- 7. capacity to present ideas clearly with supporting evidence

Delivery and Resources

The unit is run a four discrete modules which will be run in short-course format. The timing will be discussed in the first week. The first four assignments are for submitted work associated with these modules. The final assignment is a full research assignment, and the take-home exam will revisit the skills developed during the course and assess competence without direct guidance.

Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](#). Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

Assessment Policy http://mq.edu.au/policy/docs/assessment/policy_2016.html

Grade Appeal Policy <http://mq.edu.au/policy/docs/gradeappeal/policy.html>

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy (in effect until Dec 4th, 2017): http://www.mq.edu.au/policy/docs/disruption_studies/policy.html

Special Consideration Policy (in effect from Dec 4th, 2017): <https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policies/special-consideration>

In addition, a number of other policies can be found in the [Learning and Teaching Category](#) of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in [eStudent](#). For more information visit ask.mq.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit <http://students.mq.edu.au/support/>

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module for Students](#)
- [Ask a Learning Adviser](#)

Student Services and Support

Students with a disability are encouraged to contact the [Disability Service](#) who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the [Acceptable Use of IT Resources Policy](#). The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

PG - Capable of Professional and Personal Judgment and Initiative

Our postgraduates will demonstrate a high standard of discernment and common sense in their professional and personal judgment. They will have the ability to make informed choices and

decisions that reflect both the nature of their professional work and their personal perspectives.

This graduate capability is supported by:

Learning outcomes

- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information
- 6. application of knowledge to solving problems and evaluating ideas and information
- 7. capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment II
- Assignment III
- Assignment IV
- Major Assignment V
- Take home exam

PG - Discipline Knowledge and Skills

Our postgraduates will be able to demonstrate a significantly enhanced depth and breadth of knowledge, scholarly understanding, and specific subject content knowledge in their chosen fields.

This graduate capability is supported by:

Learning outcomes

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information

Assessment tasks

- Assignment I
- Assignment II
- Assignment III
- Assignment IV
- Major Assignment V
- Take home exam

PG - Critical, Analytical and Integrative Thinking

Our postgraduates will be capable of utilising and reflecting on prior knowledge and experience,

of applying higher level critical thinking skills, and of integrating and synthesising learning and knowledge from a range of sources and environments. A characteristic of this form of thinking is the generation of new, professionally oriented knowledge through personal or group-based critique of practice and theory.

This graduate capability is supported by:

Learning outcomes

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information

Assessment tasks

- Assignment I
- Assignment II
- Assignment III
- Assignment IV
- Major Assignment V
- Take home exam

PG - Research and Problem Solving Capability

Our postgraduates will be capable of systematic enquiry; able to use research skills to create new knowledge that can be applied to real world issues, or contribute to a field of study or practice to enhance society. They will be capable of creative questioning, problem finding and problem solving.

This graduate capability is supported by:

Learning outcomes

- 1. understanding the fundamentals of scientific data structure
- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 5. competence in accessing, using and synthesising appropriate information
- 6. application of knowledge to solving problems and evaluating ideas and information

Assessment tasks

- Assignment I
- Assignment II

- Assignment III
- Assignment IV
- Major Assignment V
- Take home exam

PG - Effective Communication

Our postgraduates will be able to communicate effectively and convey their views to different social, cultural, and professional audiences. They will be able to use a variety of technologically supported media to communicate with empathy using a range of written, spoken or visual formats.

This graduate capability is supported by:

Learning outcomes

- 2. understanding of how to manipulate and process batch data
- 3. understanding of the fundamentals of visualisation of scientific datasets
- 5. competence in accessing, using and synthesising appropriate information
- 7. capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment I
- Assignment II
- Assignment III
- Assignment IV
- Major Assignment V
- Take home exam

PG - Engaged and Responsible, Active and Ethical Citizens

Our postgraduates will be ethically aware and capable of confident transformative action in relation to their professional responsibilities and the wider community. They will have a sense of connectedness with others and country and have a sense of mutual obligation. They will be able to appreciate the impact of their professional roles for social justice and inclusion related to national and global issues

This graduate capability is supported by:

Learning outcomes

- 3. understanding of the fundamentals of visualisation of scientific datasets
- 4. understanding scientific methodology
- 6. application of knowledge to solving problems and evaluating ideas and information
- 7. capacity to present ideas clearly with supporting evidence

Assessment tasks

- Major Assignment V
- Take home exam