



GEOS385

Global Tectonics

S1 Day 2014

Earth and Planetary Sciences

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General Information

Unit convenor and teaching staff

Unit Convenor

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Send email to book time

Other Staff

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Credit points

3

Prerequisites

(GEOS205 or GEOS268) and (GEOS206 or GEOS260 or GEOS272)

Corequisites

Co-badged status

Unit description

In this unit, integrated geophysical, petrological and stratigraphic methodologies are used to explore global tectonics. Recent advances in the understanding of the structure, composition and history of the lithosphere and the asthenosphere are presented. Continental reconstructions through time as inferred from geophysical, palaeomagnetic and geological evidence are discussed. Plate tectonics, supercycles and recent developments in the understanding of mantle/lithosphere dynamics are applied to the billion year tectonic history of Australia and its neighbours in Gondwanaland.

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:

Understanding of issues concerning the global tectonics of the earth

Understanding of mantle and lithosphere dynamics

Understanding of the basic concepts of tectonic plate motions

Understanding scientific methodology

Competence in accessing, using and synthesising appropriate information

Application of knowledge to solving problems and evaluating ideas and information

Capacity to present ideas clearly with supporting evidence

Assessment Tasks

Name	Weighting	Due
<u>Assignment I</u>	10%	11/04/2014
<u>Assignment II</u>	10%	23/05/2014
<u>Research paper</u>	30%	07/06/2014
<u>Final examination</u>	50%	University Examination Period

Assignment I

Due: **11/04/2014**

Weighting: **10%**

On successful completion you will be able to:

- Understanding of issues concerning the global tectonics of the earth
- Understanding of the basic concepts of tectonic plate motions
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information

Assignment II

Due: **23/05/2014**

Weighting: **10%**

On successful completion you will be able to:

- Understanding of issues concerning the global tectonics of the earth
- Understanding of mantle and lithosphere dynamics
- Understanding of the basic concepts of tectonic plate motions
- Understanding scientific methodology
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Research paper

Due: **07/06/2014**

Weighting: **30%**

This assignment will consist of a paper, which results from reading on an individually selected topic. The paper should be in the form of a paper for submission to the journal; *Journal of Geophysical Research*. Topics will be related to the tectonic and geological history of Australia or any lithospheric plate. As well, a GMT exercise needs to be completed related to the chosen topic. At the end of the semester, in week 13, each student will be required to give a seminar about his/her research topic.

On successful completion you will be able to:

- Understanding of issues concerning the global tectonics of the earth
- Understanding of mantle and lithosphere dynamics
- Understanding of the basic concepts of tectonic plate motions
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Final examination

Due: **University Examination Period**

Weighting: **50%**

The final two-hour exam will consist of questions to be answered in essay style and will cover all aspects of the unit.

On successful completion you will be able to:

- Understanding of issues concerning the global tectonics of the earth
- Understanding of mantle and lithosphere dynamics
- Understanding of the basic concepts of tectonic plate motions
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Delivery and Resources

Lecture Times and Venue:

Lecture: Monday 12:00PM to 2:00 PM at Building E5A 170

Practical 1: Monday 3:00PM to 6:00PM at Building E5A 270

Practical 2: Tuesday 9:00AM to 12:00PM at Building E5A 270

TEXTBOOK AND TECHNOLOGY USED

The recommended textbook for the unit is "The Solid Earth (2nd Ed)" by Fowler. The book "Global Tectonics" by Kearey, Klepeis & Vine is a useful text and worth considering.

The unit also has a WEB site which can be found through the Online Learning @ MQ WEBSITE at <http://ilearn.mq.edu.au/>. This site contains information such as copies of colour images, copies of overheads and PowerPoint's shown in class and copies of the practicals that we do in class. The WEB site will also allow access to the digital version of the lectures recorded through the iLecture system. As well, this site will access the on-line quizzes that will need to be completed during the semester. At the start of the year you should be issued with a username and password to access all the WEB sites available for the units you have taken. This will get you into the front page of the GEOS385 WEB site.

Unit Schedule

Week	Topic	Practical
Week 1	IntroductionEarly Earth history and the core	The Core
Week 2	The MantleHotspots and convection	Mantle convection
Week 3	Seismology	Seismology
Week 4	Plates and plate marginsPlate Motion	Plate motion
Week 5	Marine magnetic anomaliesPalaeomagnetism	Good Friday. No Prac
Week 6	Seismology	Plate motion Palaeomagnetism
Week 7	Gravity and the Geoid	GMT
RECESS 14-28 April		
Week 8	4D Lithosphere Mapping	Lithosphere Mapping
Week 9	Plumes and how the Earth works.Archean Lithosphere Formation	Lithosphere Mapping
Week 10	HeatEven more heat	Heat
Week 11	Uranium Series : The basicsTime scales of magmatic processes	Uranium Series
Week 12	Continuum mechanismOr flexure and potential field	Continuum mechanism
Week 13	Seminars	Seminars

Learning and Teaching Activities

Lectures

Two hours of lectures each week

Practicals

Four hours of practicals each week

Assignments

Two essay-based assignments

Research paper

One research paper assignment

Presentation

Students are required to orally present their research papers for 15 minutes.

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.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy http://mq.edu.au/policy/docs/grievance_management/policy.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

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/

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://informatics.mq.edu.au/help/>.

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

Graduate Capabilities

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Application of knowledge to solving problems and evaluating ideas and information

Assessment task

- Research paper

Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information

Assessment tasks

- Assignment I
- Assignment II
- Research paper

Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- Understanding of issues concerning the global tectonics of the earth
- Understanding of mantle and lithosphere dynamics
- Understanding of the basic concepts of tectonic plate motions

Assessment tasks

- Assignment I
- Assignment II
- Final examination

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment I
- Assignment II
- Research paper
- Final examination

Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment I
- Assignment II
- Final examination

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Assessment task

- Assignment I

Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcomes

- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Application of knowledge to solving problems and evaluating ideas and information
- Capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment I
- Research paper
- Final examination

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social

justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- Understanding of issues concerning the global tectonics of the earth
- Understanding scientific methodology

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- Understanding of issues concerning the global tectonics of the earth
- Understanding scientific methodology