



GEOS385

Global Tectonics

S1 Day 2016

Dept of Earth and Planetary Sciences

Contents

<u>General Information</u>	2
<u>Learning Outcomes</u>	2
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	5
<u>Policies and Procedures</u>	7
<u>Graduate Capabilities</u>	8

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General Information

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Credit points

3

Prerequisites

6cp in GEOS or MATH or PHYS units at 200 level including GEOS205

Corequisites

Co-badged status

Unit description

This unit integrates recent advances in geodynamics, geophysics, geochemistry, and geology to understand the long-term tectonic evolution of the Earth, and its impact on the surface.

Topics covered include structure and dynamics of the Earth, physical processes driving Earth dynamics, fundamentals of modern earthquake seismology, plate motions through time, paleomagnetism, global supercycles, and recent developments in the understanding of mantle/lithosphere dynamics.

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
Online Quizzes	7%	Various
Assignment I	7%	Week 4
Assignment II	8%	Week 7
Assignment III	8%	Week 11
Research Paper & Seminar	20%	Week 12
Final Exam	50%	July

Online Quizzes

Due: **Various**

Weighting: **7%**

Students will complete 5 online quizzes, on each module of the course.

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
- Application of knowledge to solving problems and evaluating ideas and information

Assignment I

Due: **Week 4**

Weighting: **7%**

Assignment on module 1

On successful completion you will be able to:

- Understanding of mantle and lithosphere dynamics
- Competence in accessing, using and synthesising appropriate information

- Application of knowledge to solving problems and evaluating ideas and information

Assignment II

Due: **Week 7**

Weighting: **8%**

Assignment on plate tectonics module

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
- Application of knowledge to solving problems and evaluating ideas and information

Assignment III

Due: **Week 11**

Weighting: **8%**

Assignment on continental lithosphere module

On successful completion you will be able to:

- 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

Research Paper & Seminar

Due: **Week 12**

Weighting: **20%**

Research Paper

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 Exam

Due: **July**

Weighting: **50%**

Final Exam

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

Delivery and Resources

Lecture Times and Venue:

There will be two lectures (each one hour) and three-hour practicals session on each of week of first semester.

Lectures: Thursday 9am and 10am, E8A 386.

Practical 1: Thursday 11am-2pm, E5A 270.

Practical 2 (pending requests): Friday 11am-2pm, 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.

Below is a list of references that may be helpful in expanding certain aspects of the unit.

REFERENCES

QC806.A515	Anderson D.L., Theory of the Earth, 1989
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QB501.N47 1990	Beatty J.K. & Chaikin A. (Eds), The New Solar System (3rd ed.), 1990
QE509.B75	Bott M.P., The interior of the Earth (2nd ed.), 1982
*QE501.4.P35.B88	Butler R.F., Paleomagnetism, 1991
*QE527.7 .C66/2001	Condie K.C., Mantle Plumes and their record in Earth History, 2001
QC806.C65	Cook A.H., Physics of the Earth and Planets, 1973
QE511.4.C683/1986	Cox A. & Hart R.B., Plate tectonics: how it works, 1986
QE509.4.D38/1999 Convection, 1999	Davies G.F., Dynamic Earth, Plates, Plumes and Mantle Convection, 1999
QC806.D39	De Bremaecker J-C, Geophysics: The earth's Interior, 1985
QB501.N18	Dermott S.F. (Ed), The origin of the Solar System, 1977
QE501.E67/1990	Ernst W.G., The Dynamic Planet
QC806.F625	Fowler C.M.R., The Solid Earth, 1990
*QC806.F625/2005	Fowler C.M.R., The Solid Earth (2nd Ed), 2005
QC827.I7	Irving E., Paleomagnetism, 1964
QE509.E234/1998	Jackson I, The Earth's Mantle, 1998
QE509.J27/1992	Jacobs J.A. Deep Interior of the Earth, 1992
QE509.E232/2000	Karato S. et al, Earth's Deep Interior, 2000
QE511.4.K43/1996	Kearey P. & Vine F.J., Global Tectonics (2 Ed), 1996
*QE511.4.K43/2009	Kearey P., Klepeis K.A. & Vine F.J., Global Tectonics
QE35.E18 1979	McElhinny M.W., The Earth, its Origin, Structure and Evolution, 1979
QE501.4.P35.M35/2000 oceans, 2000	McElhinny, M.W.& McFadden, P., Paleomagnetism: continents and oceans, 2000
QC816.M4	Merrill R.T. & McElhinny M.W., The Earth's Magnetic Field, 1983
QC816.M47/1996	Merrill R.T., McElhinny M.W. & McFadden P.L. The magnetic field of the Earth: palaeomagnetism, the core, and the deep mantle, 1996
QE511.4.H57/2000 2000	Richards et al, The History and Dynamics of Global Plate Motions, 2000
QE501.S3/1982	Scheidegger A.E., Principles of Geodynamics
QC806.S54/1997	Sleep N.H. & Fujita K., Principles of Geophysics, 1997

QE26.2.C35	Smith D.G. (Ed), The Cambridge Encyclopaedia of Earth Sciences
QC806.S65	Stacey F.D., Physics of the Earth (2nd & 3rd eds.), 1977 & 1992
QE511.44.G46	Summerfield M.A., Geomorphology and Global Tectonics, 2000
QE501.T83	Turcotte D.L. & Schubert G., Geodynamics, 1982
*QE340.B55	Veevers J. J., Billion-year earth history of Australia and neighbours in Gondwanaland, 2000
*QE340.B552	Veevers J.J., Billion-year earth history of Australia

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

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy prior to Session 2 2016 <http://mq.edu.au/policy/docs/grading/policy.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 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/

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://stu>

dents.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

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 of mantle and lithosphere dynamics
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information
- Capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment I
- Research Paper & Seminar

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 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

Assessment tasks

- Online Quizzes
- Assignment I
- Assignment III
- Research Paper & Seminar
- Final Exam

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 of mantle and lithosphere dynamics
- 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

- Assignment III
- Research Paper & Seminar
- Final Exam

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

- Online Quizzes
- Assignment I
- Assignment II
- Assignment III
- Research Paper & Seminar
- Final Exam

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 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

Assessment tasks

- Assignment I
- Assignment II
- Assignment III
- Research Paper & Seminar
- Final Exam

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 of mantle and lithosphere dynamics
- Understanding scientific methodology
- Competence in accessing, using and synthesising appropriate information

Assessment tasks

- Assignment I
- Assignment II
- Assignment III
- Research Paper & Seminar

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
- Capacity to present ideas clearly with supporting evidence

Assessment tasks

- Assignment III
- Research Paper & Seminar
- Final Exam

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 scientific methodology
- Competence in accessing, using and synthesising appropriate information

Assessment task

- Research Paper & Seminar

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 scientific methodology
- Competence in accessing, using and synthesising appropriate information

Assessment tasks

- Assignment III
- Research Paper & Seminar