



# GEOS272

## Deformation and Metamorphism

S2 Day 2019

*Dept of Earth and Environmental Sciences*

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## General Information

Unit convenor and teaching staff

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Credit points

3

Prerequisites

GEOS125 or GEOS126 or GEOS112

Corequisites

Co-badged status

Unit description

This unit explores interdisciplinary perspectives on the origin and geological evolution of Australia. Join us to explore the geology of Australia from Archaean cratonic shields to Proterozoic fold belts and basins of the western two-thirds of Australia and discover the immense continental growth during the Phanerozoic evolution of the eastern margin of Australia. This skills-based unit integrates projects, lectures and laboratory classes to develop theoretical knowledge and hands-on experience needed to describe and interpret deformed and metamorphosed rocks.

## 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:

An understanding of the geologic history of Australia

An understanding of the different plate boundaries associated with the Australian Plate

Developing skills in rock identification, recognition of basic geological structures and/or inference of depositional environments from field observations

Develop the skills needed to typify the bedrock controls on landforms and geomorphology

Develop the skills needed to interpret the significance of microstructures in geoscience materials

Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement

Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem

Understand how to apply geoscientific principles to understanding the world around you

Developing independence and skills for working in a group

Competence in accessing, using and synthesizing appropriate information through writing and/or video

## **General Assessment Information**

### **Presentation of Written Reports**

Since most of what you learn is tested in written form, it is essential that you learn to write effectively. You are required to research, prepare and write the research abstracts, the case study and field trip reports. Organisation is the key to achieving this, and the following steps should assist you.

#### **Preparation of reports:**

1. Determine what is required in the case study report. Make sure you understand each word used to ensure that you are writing to the topic set, not to one of your own invention.
2. Read the relevant unit material and generate a list of key words, which will help you locate other references in the Library. Do this early. Remember that reference books may be hard to find if you leave your library research too late.
3. When taking notes from a reference always note the bibliographical information and Call Number. If you write down a quotation, take a note of the page it was on. There is nothing more frustrating than having to look back through a book for one sentence.

#### **The Drafts (at least one — more probably two or three)**

1. Keep referring back to the question — have you strayed from the topic?
2. Single sentences or paragraphs should not express too many ideas. A logical development of your theme should be the aim throughout the essay.

3. In your initial draft, do not worry too much about the word limit. It is a simple matter to cut extraneous or repetitive material in subsequent rewrites — in fact this should be your aim.
4. Support your statements with facts and references.
5. References: quotations should be used only if the point being made is vital to your argument and if you could not express it better yourself.

## Formatting

1. All typed text submitted for case studies is to be 12 point font at 1.5 line spacing. Margins should be approximately 2cm. Place your name and student number in the header and number each page.
2. Page limits should be strictly adhered to.
3. \* All text-based assessments are to be submitted electronically (via Turnitin) \* Students must keep a copy of their reports.
4. In all that you hand in, marks will be given for “communication”; that is how effectively you communicate your ideas. This will include how well your text/maps/profiles/sketches convey your concepts, and how well written your report is (including correct use of English and of referencing procedures).

Desired Standards	
Grade	Standard Required
High Distinction	Demonstrates an extensive knowledge and understanding of the concepts of the course.  Analysis skills are very sophisticated with a balance of individual components and larger ideas. Capable of generalising from examples and evaluating ideas.

Distinction	Demonstrates a thorough knowledge and understanding of the concepts of the course.  Analysis skills are sophisticated with a balance of individual components and larger ideas. Capable of generalising from examples and evaluating ideas.
Credit	Demonstrates a sound knowledge and understanding of the concepts of the course.  Can break down complex problems into components and synthesise multiple factors into a larger idea. Can evaluate the importance and limitations of data.
Pass	Demonstrates a basic knowledge and understanding of the concepts of the course.  Analysis is mainly descriptive. Demonstrates limited capacity to identify complex factors within an idea or to combine multiple factors.
Fail	Demonstrates a poor knowledge and understanding of the concepts of the course.  Analysis skills are very limited.

## Extensions

Extensions for reports and workshop submissions will be given only for illness or misadventure, which must be supported by documentation and a written request. This request should also indicate the extension period required.

For Tasks 10% or above - No extensions will be granted. There will be a deduction of 5% of the total available marks made from the total awarded mark for each 24 hour period or part thereof that the submission is late (for example, 25 hours late in submission – 10% penalty). This penalty does not apply for cases in which an application for disruption of studies is made and approved. No submission will be accepted after solutions have been posted.

If you receive special consideration for the final exam, a supplementary exam will be scheduled in the interval between the regular exam period and the start of the next session. By making a special consideration application for the final exam you are declaring yourself available for a resit during the supplementary examination period and will not be eligible for a second special consideration approval based on pre-existing commitments. Please ensure you are familiar with the policy prior to submitting an application. You can check the supplementary exam information page on FSE101 in iLearn ([bit.ly/FSESup](http://bit.ly/FSESup)) for dates, and approved applicants will receive an individual notification one week prior to the exam with the exact date and time of their supplementary examination.

## Feedback

Feedback on assessment tasks is given in this unit in the following ways:

- 1) Our primary mode of assessment feedback: the assessment marker will present overall

feedback to the class, at either a lecture or in a tutorial, on what aspects of the assignment were done best and where improvement is needed in general.

2) Scoring full marks for a given component indicates that you did exceptionally well. Alternatively, scoring poorly in a component strongly suggests it required further work.

3) Students are strongly encouraged to seek further feedback (at the time it is given or by making an appointment with the assessment marker) if they are unsure of any aspect of the feedback or if they want further feedback.

4) In the instance of scoring very poorly overall, you will be provided with written feedback on the assignment indicating where you could improve.

## Assessment Tasks

Name	Weighting	Hurdle	Due
<u>In Class and iLearn Quizzes</u>	10%	No	See Unit schedule
<u>Research Topic Abstract/Video</u>	20%	No	Week 3 and Week 11
<u>Field Work Reports</u>	20%	No	Week 7 and Week 11
<u>Geological History Assignment</u>	10%	No	Week 9
<u>Final Exam</u>	40%	No	TBA

### In Class and iLearn Quizzes

Due: **See Unit schedule**

Weighting: **10%**

There are a total of 9 Quizzes: 4 Class Quizzes will be given during the practicals and 6 online iLearn Quizzes.

- Class Quizzes are done by you alone, closed-book. Up to five questions in each Quiz will be based on prior lecture material. External students will have their Class Quizzes available online.
- iLearn Quizzes involve practice stereonet problems similar to the question in the final exam. There are six practice problems in total spread over the session in the lead up to the final exam.

On successful completion you will be able to:

- An understanding of the geologic history of Australia
- An understanding of the different plate boundaries associated with the Australian Plate
- Develop the skills needed to interpret the significance of microstructures in geoscience

materials

- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Understand how to apply geoscientific principles to understanding the world around you

## Research Topic Abstract/Video

Due: **Week 3 and Week 11**

Weighting: **20%**

**1. Research Topic Abstract (10%):** One page Abstract on the Research Topic on any aspect of the Geology of the Australian Plate, Due: End of Week 3

This is an individual assessment task, even if you choose to work in a pair for the subsequent Video Presentation, so please make sure you both hand in separate aspects of the research topic in your assignment. Information on the structure and format of the Research Topic Abstract will be available on iLearn Week 1

**2. Video Presentation (10%):** Either individually or in pairs to deliver a 3 to 4 minute-long video presentation on a subject of the selected Research Topic on any aspect of the Geology of the Australian Plate - as outlined in your Research Topic Abstract, Due: End of Week 11. Video will be presented during classes of Weeks 12-13.

On successful completion you will be able to:

- An understanding of the geologic history of Australia
- An understanding of the different plate boundaries associated with the Australian Plate
- Understand how to apply geoscientific principles to understanding the world around you
- Developing independence and skills for working in a group
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

## Field Work Reports

Due: **Week 7 and Week 11**

Weighting: **20%**

**1. Narrabeen Field Trip Report (10%)** 800 words approx.

The Narrabeen trip is compulsory for internal students.

External students are encouraged to attend, if that is not possible contact Elena Belousova (elena.belousova@mq.edu.au) for alternative Assignment to be arranged.

## 2. Lachlan Field Trip Report (10%)

Lachlan field trip mark is based on assessment of students individual field books and field mapping exercise. To be submitted at the end of the trip.

This field trip is compulsory for both internal and external students.

On successful completion you will be able to:

- Developing skills in rock identification, recognition of basic geological structures and/or inference of depositional environments from field observations
- Develop the skills needed to typify the bedrock controls on landforms and geomorphology
- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Developing independence and skills for working in a group

## Geological History Assignment

Due: **Week 9**

Weighting: **10%**

Complete one geological history table for the map provided. Complete the A3 size table by hand (download from iLearn), neatly filled out or type into the cells in Excel (also download from iLearn).

On successful completion you will be able to:

- Developing skills in rock identification, recognition of basic geological structures and/or inference of depositional environments from field observations
- Develop the skills needed to typify the bedrock controls on landforms and geomorphology
- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Understand how to apply geoscientific principles to understanding the world around you



## Final Exam

Due: **TBA**

Weighting: **40%**

The final exam will cover material from the lectures, text-book readings, class exercises and case studies. Questions will draw on information and ideas from different lectures and practicals to give an integrated view of the unit. The exam will include questions that ask you to apply your knowledge to interpret and solve problems.

You will be allowed to take one A4 page of notes into the exam, otherwise it is closed book.

On successful completion you will be able to:

- An understanding of the geologic history of Australia
- An understanding of the different plate boundaries associated with the Australian Plate
- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Understand how to apply geoscientific principles to understanding the world around you
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

## Delivery and Resources

This unit on the origin and geological evolution of Australia and its plate margins. During this unit we will explore the geology of Australia from Archaean cratonic shields to Proterozoic fold belts and sedimentary basins of the western two-thirds of Australia. Discover the immense continental growth during the Phanerozoic evolution of the eastern margin of Australia. We will have a guest lecturer Dr. Dick Glen, a former Principal Research Scientist at the Geological Survey of NSW, who will also lead a weekend field trip to the Goulburn area (Lachlan Orogen field trip). You will also learn about the main concepts of U-Pb geochronology and explore appropriate computer tools to solve problems related to geochronology.

This unit integrates projects, lectures and laboratory classes to develop theoretical knowledge and hands-on experience needed to map, describe and interpret rocks in the field and laboratory. Field studies involve ground-based observations of rock types, rock structures and the relationship between geology and topography.

## Contacts and Communication

Convenors: **A/Prof. Nathan Daczko** (nathan.daczko@mq.edu.au) and **A/Prof. Elena Belousova** (elena.belousova@mq.edu.au)

Department of Earth and Planetary Sciences (EPS), Macquarie University.

EPS Admin (if Convenors are not available): E7A/12 Wally's Walk, Level 3, Office 317 or 318, phone 02 9850 8426 or 02 9850 8373

**Other staff teaching on unit and guest lecturers:**

**Dr Bruce Schaefer** - bruce.schaefer@mq.edu.au; Ph: 9859 8368

**Dr Dick Glen** (visiting lecturer) - geology.rg@gmail.com; Mobile: 04128 16437

If sending email, please include GEOS272 in the subject line.

We will communicate to you mainly through your student email account/iLearn at Macquarie University. Please make sure you check this email at least weekly.

## Late Enrolments

If you enrol late in the unit, you will have already missed one or more lectures. It is your responsibility to catch up. Also, you will still be expected to submit all assignments within the remaining time.

Lectures, availability of lecture material and attendance requirements

It is the policy in this unit to encourage students to attend one lecture and one practical per week, and make their own notes from the lectures. It is expected that many of the lectures will be interactive, with questions and answers throughout. Lectures will be recorded using Echo 360, and files of the lecture graphics will also be made available through iLearn. These will be particularly useful for revision purposes. Note that Class Quizzes will be given during practicals or lectures, so do not miss them! (External students will have online access to their quizzes).

## Hours

This is a 3 credit point unit. It is anticipated that you will spend >9 hours per week involved with the unit, including the 5-hour class contact time per week. It is particularly important that you spend plenty of time preparing the four major assignments: Research Topic Abstract, Narrabeen Field Report, Geological History Assignment and Video Presentation.

## Set Textbook and Background Reading

- Text Book by Robert Henderson and David Johnson "The Geology of Australia", 3rd Edition, ISBN: 978-1-107-43241-3 OR alternatively Text Book by David Johnson, James Cook University, "The Geology of Australia", 2nd Edition, 2009, ISBN: 9780521767415
- There is no set textbook for the structural and metamorphic geology components
- Background notes from Prof. Geoff Clarke, University of Sydney (will be available on

iLearn)

- You will need access to iLearn for quizzes and unit resources: Unit Guide, lectures and practicals
- You will use computers in some practicals
- You will need to be able to access books and journal papers in the library
- You will be exposed to a variety of materials and concepts in the practicals

## Policies and Procedures

Macquarie University policies and procedures are accessible from [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central>). Students should be aware of the following policies in particular with regard to Learning and Teaching:

- [Academic Appeals Policy](#)
- [Academic Integrity Policy](#)
- [Academic Progression Policy](#)
- [Assessment Policy](#)
- [Fitness to Practice Procedure](#)
- [Grade Appeal Policy](#)
- [Complaint Management Procedure for Students and Members of the Public](#)
- [Special Consideration Policy](#) (**Note:** *The Special Consideration Policy is effective from 4 December 2017 and replaces the Disruption to Studies Policy.*)

Undergraduate students seeking more policy resources can visit the [Student Policy Gateway](https://students.mq.edu.au/support/study/student-policy-gateway) (<https://students.mq.edu.au/support/study/student-policy-gateway>). It is your one-stop-shop for the key policies you need to know about throughout your undergraduate student journey.

If you would like to see all the policies relevant to Learning and Teaching visit [Policy Central](https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/policy-central) (<https://staff.mq.edu.au/work/strategy-planning-and-governance/university-policies-and-procedures/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/study/getting-started/student-conduct>

## Results

Results published on platform other than [eStudent](#), (eg. iLearn, Coursera etc.) 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](https://ask.mq.edu.au) or if you are a Global MBA

student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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](http://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](http://ask.mq.edu.au)

If you are a Global MBA student contact [globalmba.support@mq.edu.au](mailto:globalmba.support@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/](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

- Understand how to apply geoscientific principles to understanding the world around you
- Developing independence and skills for working in a group
- Competence in accessing, using and synthesizing appropriate information through

writing and/or video

## **Assessment tasks**

- In Class and iLearn Quizzes
- Research Topic Abstract/Video
- Field Work Reports
- Geological History Assignment
- Final Exam

## **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 outcome**

- Understand how to apply geoscientific principles to understanding the world around you

## **Assessment tasks**

- In Class and iLearn Quizzes
- Research Topic Abstract/Video
- Geological History Assignment
- 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**

- An understanding of the geologic history of Australia
- An understanding of the different plate boundaries associated with the Australian Plate
- Developing skills in rock identification, recognition of basic geological structures and/or

inference of depositional environments from field observations

- Develop the skills needed to typify the bedrock controls on landforms and geomorphology
- Develop the skills needed to interpret the significance of microstructures in geoscience materials
- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Understand how to apply geoscientific principles to understanding the world around you
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

## **Assessment tasks**

- In Class and iLearn Quizzes
- Research Topic Abstract/Video
- Field Work Reports
- Geological History Assignment
- 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**

- An understanding of the geologic history of Australia
- Developing skills in rock identification, recognition of basic geological structures and/or inference of depositional environments from field observations
- Develop the skills needed to typify the bedrock controls on landforms and geomorphology
- Develop the skills needed to interpret the significance of microstructures in geoscience materials
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strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement

- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Understand how to apply geoscientific principles to understanding the world around you

## **Assessment tasks**

- In Class and iLearn Quizzes
- Research Topic Abstract/Video
- Field Work Reports
- Geological History Assignment
- 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**

- An understanding of the different plate boundaries associated with the Australian Plate
- Developing skills in rock identification, recognition of basic geological structures and/or inference of depositional environments from field observations
- Develop the skills needed to interpret the significance of microstructures in geoscience materials
- Develop the skills needed to describe and analyse simple field structures, including strike/dip of inclined strata, angular relations across unconformities, the style and attitude of folds, and the types of faults and their displacement
- Develop the skills needed to interpret cross-cutting relationships in the field and laboratory to determine the sequence of geoscience events for a given problem
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

## **Assessment tasks**

- In Class and iLearn Quizzes
- Research Topic Abstract/Video



- Field Work Reports
- Geological History Assignment
- Final Exam

## 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

- Understand how to apply geoscientific principles to understanding the world around you
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

### Assessment tasks

- In Class and iLearn Quizzes
- Research Topic Abstract/Video
- Geological History Assignment
- Final Exam

## 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

- Understand how to apply geoscientific principles to understanding the world around you
- Developing independence and skills for working in a group
- Competence in accessing, using and synthesizing appropriate information through writing and/or video

### Assessment tasks

- In Class and iLearn Quizzes
- Research Topic Abstract/Video



- Field Work Reports
- Geological History Assignment
- Final Exam