



GEOS3314

Environmental and Exploration Geophysics

Session 2, Weekday attendance, North Ryde 2020

Department of Earth and Environmental Sciences

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Notice

As part of [Phase 3 of our return to campus plan](#), most units will now run tutorials, seminars and other small group learning activities on campus for the second half-year, while keeping an online version available for those students unable to return or those who choose to continue their studies online.

To check the availability of face-to-face and online activities for your unit, please go to [timetable viewer](#). To check detailed information on unit assessments visit your unit's iLearn space or consult your unit convenor.

General Information

Unit convenor and teaching staff

Convener/Lecturer

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Lecturer

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Credit points

10

Prerequisites

20cp from GEOS or MATH or PHYS units at 2000 level including GEOS2311 or GEOS205

Corequisites

Co-badged status

Unit description

This unit explores the application of modern geophysical techniques to help solve environmental, geotechnical, ground water and exploration problems. Generally, emphasis is placed on the applications and relative merits of the various methods for particular aspects of environmental and exploration problems, rather than on rigorous theoretical treatment. This unit builds on the foundation work covered in GEOS2311, incorporating case history studies to further illustrate the application of geophysical methods. Practical work includes laboratory and computational exercises in the reduction, plotting and interpretation of geophysical data. Field excursions give students an appreciation of the practical application of cutting-edge geophysics, highlighting the advantages and limitations of the techniques studied during the unit for solving real-world problems.

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:

ULO1: demonstrate a good understanding of the concepts of environmental and exploration geophysics

ULO2: demonstrate an understanding of how geophysical equipment takes measurements

ULO3: demonstrate an understanding of scientific methodology and how to apply knowledge to solving problems and evaluating ideas and information

ULO4: show competence in acquiring, processing and interpreting geophysical data

ULO5: effectively present ideas with supporting evidence

General Assessment Information

Assessment Criteria

Assessment at Macquarie University is standards-based, as outlined in the [Assessment Policy](#). This means that your work will be assessed against clear criteria, and these criteria (e.g. in a rubric) will be made available when the assessment tasks are released to you on iLearn.

Submission of Assessments

All assessments must be submitted online through [Turnitin](#) unless otherwise indicated. Links for the submission of each assessment will be available on [iLearn](#).

You should always check that you have uploaded the correct file. If you have a problem, please email the Unit Convenor with your correct file. You must also keep a copy of your assessments until the end of semester in case there is a problem with your submission. It is your responsibility to ensure that you can provide a copy of your assessment if requested.

Marking of Assessments

Assignments will usually be marked through Turnitin with grades provided through Gradebook on iLearn. Please do not submit your assessments via email or in hard copy unless requested (e.g. a sketch or drawing).

We aim to return your assessment grades and feedback within two to three weeks of the date that you submitted it. We appreciate your patience and will advise you through iLearn when your marked assessments and feedback are available for viewing.

Penalties for Late Assessments

The penalty for late submission of assessments in this unit is **ten percent (10 %) of the**

assessment value per day, calculated from the due time and date. This means that if the assignment is worth a total of 30 marks (or 30 % of the unit) you will lose 3 marks for each day it is late. This is a hefty penalty designed to make you aware of the importance of organising yourself around assessment due dates. The penalty will be applied over weekdays and weekends unless you have been granted an extension prior to the due date.

Extensions for Assessments

To obtain an extension for an assessment task, you will need to follow the formal process as outlined in the [Special Consideration Policy](#), and you must provide appropriate supporting evidence (e.g. medical certificate - see advice for [Special Consideration](#) requests). The final decision regarding the granting of an extension lies with the unit convenor. Permission for extensions must be sought **before the due date** unless there are exceptional circumstances. Please let us know of problems in advance or as soon as possible, not after the event. We are likely to be much more sympathetic and able to accommodate your circumstance if you follow this advice.

Exams

Details of exam conditions and timetables can be found on the [Exams and Results](#) portal. The draft exam timetable will be released approximately eight weeks before the commencement of the exams. The final exam timetable will be published 4 weeks before commencement. All students (including exchange students) are expected to present themselves for the exam at the time and place designated in the exam timetable. Note this may include weekends.

For unavoidable disruptions during exams, you should apply for [Special Consideration](#) as soon as possible. If a Supplementary Examination is granted as a result of the Special Consideration process, the exam time will be scheduled after the conclusion of the official examination period and you will receive an individual notification prior to the exam with the exact date and time of the Supplementary Examination. You will only be allowed one opportunity to sit the Supplementary Exam as outlined in the [Special Consideration Policy](#).

Assessment Tasks

Name	Weighting	Hurdle	Due
Final Examination	40%	No	Exam period
Field Report	30%	No	Week 13
Oral Presentation	10%	No	TBD
on-line quizzes	20%	No	Weekly

Final Examination

Assessment Type ¹: Examination

Indicative Time on Task ²: 20 hours

Due: **Exam period**

Weighting: **40%**

The exam will consist of a choice of questions to be answered in essay style.

On successful completion you will be able to:

- demonstrate a good understanding of the concepts of environmental and exploration geophysics
- effectively present ideas with supporting evidence

Field Report

Assessment Type ¹: Report

Indicative Time on Task ²: 30 hours

Due: **Week 13**

Weighting: **30%**

During the field trip undertake a geophysical survey to obtain a dataset in order to answer a specific question. Then analyse and model the data to aid in the understanding of the problem. Then write a report on the outcome of the analysis and interpretation of the data.

On successful completion you will be able to:

- demonstrate a good understanding of the concepts of environmental and exploration geophysics
- demonstrate an understanding of how geophysical equipment takes measurements
- demonstrate an understanding of scientific methodology and how to apply knowledge to solving problems and evaluating ideas and information
- show competence in acquiring, processing and interpreting geophysical data
- effectively present ideas with supporting evidence

Oral Presentation

Assessment Type ¹: Presentation

Indicative Time on Task ²: 8 hours

Due: **TBD**

Weighting: **10%**

Each student has to select a topic relevant to the unit on which a 10-15 minute long oral

presentation must be given during the class hours. A selection of topics is given at the beginning of the unit

On successful completion you will be able to:

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on-line quizzes

Assessment Type ¹: Quiz/Test

Indicative Time on Task ²: 17 hours

Due: **Weekly**

Weighting: **20%**

Pre-workshop and in-workshop quizzes

On successful completion you will be able to:

- demonstrate a good understanding of the concepts of environmental and exploration geophysics
- show competence in acquiring, processing and interpreting geophysical data

¹ If you need help with your assignment, please contact:

- the academic teaching staff in your unit for guidance in understanding or completing this type of assessment
- the [Writing Centre](#) for academic skills support.

² Indicative time-on-task is an estimate of the time required for completion of the assessment task and is subject to individual variation

Delivery and Resources

Unit iLearn

This unit has an iLearn page that can be accessed through ilearn.mq.edu.au. It contains important information and other materials relating to the unit, including details and links for assessments.

Communication

The unit iLearn is the primary way that we communicate with you. Please check it regularly for announcements and posts. You are encouraged to use the Discussion Board on iLearn to post questions and generate discussion with other students. Please only email the convenor with private matters – all other questions should be posted on iLearn.

Unit Organisation

This unit is delivered in weekly topics. The organisation of these is outlined in a detailed unit schedule which is available on [iLearn](#).

Workload

The expected workload for this 10-credit point unit is 150 hours of activity.

Recommended Texts and/or Materials

There is no compulsory textbook for this unit, but I recommend that you get a copy of “*An Introduction to Applied and Environmental Geophysics*” by Reynolds or “*An Introduction to Geophysical Exploration*” by Kearey *et al* as they look at the material at an appropriate level. As well, “*Geophysics for the Mineral Exploration Geoscientist*” by Dentith and Mudge is also worthwhile. If you already have one of the following books then that should be sufficient. All the books listed below give a good grounding in geophysics, just with a different focus

Burger, H.R., *Exploration Geophysics of the Shallow Subsurface*, Prentice-Hall, 1992. [TN269.B86]

Dentith M. and Mudge S.T., *Geophysics for the Mineral Exploration Geoscientist*, Cambridge University Press, 2014.

Gunn, P., *AGSO Journal of Australian Geology and Geophysics* 17, 1997. [QE340.A7]

Isles D.J. and Rankin L.R., *Geological Interpretation of Aeromagnetic Data*, ASEG, 2013 **e-book**

Kearey, P., Brooks, M. and Hill, I., *An Introduction to Geophysical Exploration*, 3rd Edition, Blackwell Scientific Publications, 2002. [TN269.K36/2002]

Lowrie, W., *Fundamentals of Geophysics*, Cambridge University Press, 1997. [QC806.L67/1997]

Mussett A.E. and Khan M.A., *Looking into the Earth*, Cambridge, 2000. [QE501.M87/2000]

Parasnis, D.S., *Principles of Applied Geophysics*, 5th Edition, Chapman and Hall, 1997. [TN269.P32]

Reynolds, J.M., *An Introduction to Applied and Environmental Geophysics*, John Wiley & Sons, 1997. [QC808.5.R49]

Reynolds, J.M., *An Introduction to Applied and Environmental Geophysics*, 2nd Edition, Wiley-Blackwell, 2011. [QC808.5.R49 2011]

Sharma, P.V., *Environmental and Engineering Geophysics*, Cambridge University Press, 1997. [TA705.S515]

Telford, W.N., Geldart, L.P., and Sheriff, R.E., *Applied Geophysics*, 2nd Edition, Cambridge

University Press, 1990. [TN269.T44]

Ward, S.H. (editor), *Geotechnical and Environmental Geophysics*, Vol. I-III, Society of Exploration Geophysicists, Tulsa, 1990. [TA705.G426]

Technology Used and Required

This unit will use iLearn and Echo360. See the [Instructions on how to log in to iLearn](#) and the [iLearn quick guides for students](#) which will help you:

- [Getting started](#) - Find out how to navigate and familiarise yourself with the iLearn environment
- [Activities](#) - Learn how to effectively complete the activities required of you in iLearn
- [Assignments and Gradebook](#) - Find out how to submit assessments and view your grades using iLearn
- [Online study tips](#) - Studying online is a unique experience, learn how to navigate it here
- [Discussion forums](#) - Explore the different types, and features of discussion forums in iLearn
- [Lecture recordings](#) - Find out how to access lectures online, as well as the features available to you

Unit Schedule

SCHEDULE OF TOPICS and WORKSHOPS, 2st SEMESTER 2020

DATE	LECTURER	TOPIC	Workshop
Week 1 27 Jul	Yingjie Yang	Introduction to the unit Physical Properties	Physical Properties
Week 2 3 Aug	Steven Hansen	Data Sampling and Spectral Analysis	Filtering and Fourier Analysis
Week 3 10 Aug	Yingjie Yang	Magnetics: Acquisition and Processing	Geosoft
Week 4 17 Aug	Yingjie Yang	Gravity and Magnetics	Gravity and Magnetics modelling
Week 5 24 Aug	Kate Selway	EM: Acquisition, Processing and Interpretation	MAXWELL EM Interpretation

Week 6 31 Aug	Steven Hansen	Seismic reflection method	ReflexW Seismic reflection
Week 7 7 Sep	Yingjie Yang	Surface wave survey. Radiometric: Acquisition	Multichannel analysis of surface waves (MASW)
		Mid Semester Recess Filed trip (19 Sept-23 Sept)	
Week 8 28 Sep	Guest lecturer	Potential Field Presentation and Interpretation	Field data Compilation
Week 9 5 Oct		Labor Day Holiday	
Week 10 12 Oct	Guest lecturer	Environmental Geophysics	Field data Compilation
Week 11 19 Oct	Guest lecturer	Oil and Gas Exploration	Field data Compilation
Week 12 26 Oct	Guest lecturer	Engineering Geophysics	Field data Compilation
Week 13 2 Nov	Guest lecturer	Seismic case studies	Field data Compilation

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.)

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 or if you are a Global MBA student contact 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) provides academic writing resources and study strategies to help you improve your marks and take control of your study.

- [Getting help with your assignment](#)
- [Workshops](#)
- [StudyWise](#)
- [Academic Integrity Module](#)

The Library provides online and face to face support to help you find and use relevant information resources.

- [Subject and Research Guides](#)
- [Ask a Librarian](#)

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

If you are a Global MBA student contact 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/.

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.