ENVS266

Earth Surface Processes

S1 External 2016

Dept of Environmental Sciences

Contents

General Information

Unit convenor and teaching staff
Convenor
Paul Hesse
paul.hesse@mq.edu.au
Contact via email
E5A017 or Australian Hearing Hub, Level 2
Mon - Wed

Lecturer
Kira Westaway
kira.westaway@mq.edu.au
Contact via email
Au

Tutor
Simon Mould
simon.mould@mq.edu.au
Contact via email
Australian Hearing Hub

Credit points
3

Prerequisites
ENVE117(P) or ENVS117(P) or GEOS117(P) or GEOS112(P)

Corequisites

Co-badged status

Unit description
Understanding how and why the Earth's surface looks and changes in the way it does is fundamental to effective environmental management. This unit examines earth surface processes from a catchment perspective: hill slopes and soils; rivers and floodplains. We draw on Australian and overseas examples from diverse environments to demonstrate how biophysical processes shape our landscape. Students gain practical, laboratory and field-based skills that help them interpret the landscape. These are taught in both on-campus sessions and weekend field trips. This unit builds on themes introduced in ENVS117 and GEOS112, and provides a sound conceptual background for students continuing in environmental sciences, environmental management and programs in ecology, biology, geology and archaeology.

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 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power

2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments

3 Demonstrate knowledge of important concepts of geomorphology

4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data

5 Design a field research project including data gathering and interpret your own data

6 Communicate scientific information and concepts through oral, visual and written formats, including scientific reports

Assessment Tasks

Name	Weighting	Due
Practicals (2,3,6,7)	10%	10 am Tues after prac
Field Report 1	20%	10am 26/4/16
Field Report 2	30%	10 am 7/6/16
Exam	40%	exam period

Practicals (2,3,6,7)

Due: **10 am Tues after prac**
Weighting: **10%**

Usually presentation of data, diagrams, graphs or short answers relating to the practical class.

On successful completion you will be able to:

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 6 Communicate scientific information and concepts through oral, visual and written formats, including scientific reports

Field Report 1

Due: **10am 26/4/16**
Weighting: **20%**

Report based on the first fieldtrip to Smiths Lake / Seal Rocks

On successful completion you will be able to:

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 3 Demonstrate knowledge of important concepts of geomorphology
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 5 Design a field research project including data gathering and interpret your own data
- 6 Communicate scientific information and concepts through oral, visual and written

formats, including scientific reports

Field Report 2

Due: **10 am 7/6/16**
Weighting: **30%**

Report based on the second fieldtrip to MacDonald River

On successful completion you will be able to:

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 3 Demonstrate knowledge of important concepts of geomorphology
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 5 Design a field research project including data gathering and interpret your own data
- 6 Communicate scientific information and concepts through oral, visual and written formats, including scientific reports

Exam

Due: **exam period**
Weighting: **40%**

exam

On successful completion you will be able to:

- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 3 Demonstrate knowledge of important concepts of geomorphology
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 6 Communicate scientific information and concepts through oral, visual and written

formats, including scientific reports

Delivery and Resources

- Lectures are held each Monday at 9 in W6B336 and Tuesday at 10 in E6A133
- Each internal student must attend one of three weekly 3 hour practical sessions, usually held in E5A240
- External students must attend two on-campus sessions: 19 & 20 March and 7 May
- There are two compulsory 2 day fieldtrips for all students: 19-20 March OR 8-9 April, and 21 & 22 May

LECTURES are designed to provide you with a framework with which to focus your study of the subject and are an essential and important component of the course. They are by no means exhaustive on each and every topic, and you are expected to supplement them by reading especially from the textbook but also from the current journals, where the most up-to-date information can be found. There is a reading list for you to use as a starting point later in this document, and additional material will be referred to during the lecture program. Lecture slides are available on-line through **https://ilearn.mq.edu.au/** for viewing and/or printing. Audio recordings of the lectures are available on-line shortly after delivery and are mailed to external students after that.

PRACTICAL CLASSES comprise a practical exercise, including map and air photo interpretation, numerical analysis, examination of rocks and sediments or local fieldwork. Practicals provide greater depth to the related lecture materials and are designed to assist learning by encouraging your active participation. You will usually complete the practical within the class time. The venue of the practical classes varies (see page 5). The week 1 practical is held in E5A240 and some other practicals will be held in the field within a short distance from the university. Important material for the practical classes is included in this book. Additional material may be posted on iLearn for download. **Each student must bring the appropriate equipment to the practical session and pre-read the practical description. Equipment may include; overhead transparencies, permanent FINE overhead pen (red or green preferably), drawing pencils (2B, HB, 2H), coloured pencils, ruler, sharpener, eraser, protractor, calculator, field note book. You should also wear appropriate clothes for the laboratory (week 1) and field: closed shoes, sun protection etc.**

ON-CAMPUS SESSIONS FOR EXTERNAL STUDENTS are held on weekends 1 or 2 weeks prior to the two weekend fieldtrips. There is no need to sign on at COE. You should proceed to Building E5A Room 240 by 9am. On the first day of the first on-campus session, the group will then proceed to a field site in the Lane Cove valley, starting at the end of Vimiera Rd, Marsfield (see Practical 2 description) by 9.30. We will proceed by private vehicles (sharing) and spend the morning in the field, away from shops, toilets or other facilities.

Each of these sessions will enable you to undertake the practical components of the unit and also discuss the lecture content with the lecturers. You will be expected to have listened to the audio lecture recordings before each on-campus session. In some cases (where internal lectures lag behind) you will be given additional introduction before each practical activity. It is

expected that external students will be able to access the Internet.

FIELD WORK There are two **compulsory** weekend fieldtrips in this unit during which a range of natural and human-modified landscape features are examined. Each of these fieldtrips reinforces and extends the content of the Soils and Coasts modules (first fieldtrip) or Catchment and Fluvial Processes module (fieldtrip 2). The major assignments are based on these field trips. In addition, two of the weekly practicals (Weeks 2 and 3) will be conducted in the field within the normal practical class times. The assignments and fieldtrips are described in detail elsewhere in this book. Equipment and safety issues for field work are described below.

TEXTBOOKS and ESSENTIAL READINGS

The following texts are suggested as being valuable reading. You are not required to purchase them, but may find them useful. There are some copies in the library.

- Paton TR, Humphreys GS and Mitchell PB 1995. *Soils: A New Global View*. UCL Press.
- National Committee on Soil and Terrain. (2009) Australian Soil and Land Survey Handbook, 3rd edition. CSIRO Publishing, Melbourne.
- Fryirs KA and Brierley GJ, 2013. Geomorphic analysis of river systems. Wiley-Blackwell. ISBN 978-1-4051-9274-3.

To keep up with lecture materials and also some of the practical classes and the fieldtrips you should complete all '*essential'* reading BEFORE the lectures each week. Essential readings are shown on the timetable on page 5.

TECHNOLOGY USED AND REQUIRED

You will require access to a computer for parts of this unit. You can gain access to slides used for each lecture by visiting the iLearn page for ENVS266 **(https://ilearn.mq.edu.au/)**. Audio lecture recordings will also be available shortly after live presentation through Echo 360 link in iLearn. iLearn may be used by staff to send reminders and notices concerning fieldtrips, practical classes and lectures. You should check the site regularly, especially the day before lectures/pracs. There is also the space for a bulletin board discussion between students; please feel free to use this to discuss issues relating to any aspect of the unit and geomorphology in general. For specific questions of the lecturers, email them directly (see front cover). The major assignments must also be submitted electronically through Turnitin, via the iLearn page for this unit. This software provides a means of gauging the timing of submission, an originality checker to test for potential plagiarism and a paperless grading system, more information on this program can be found at (http://turnitin.com/) and (http://mq.edu.au/iLearn/student_info/assignments.htm) and a 'quick guide' in ilearn next to the Turnitin link. Many of the readings (scientific papers) are available on-line from the library.

Unit Schedule

ENVS266 Earth Surface Processes –TIMETABLE 2016

INTERNAL LECTURE AND PRACTICAL CLASS TIMETABLE

Week	Week begin-ing	Lecture Title	Practical Class	Essential reading **(see reading list on iLearn)**
1	29/2	1 Introduction: unit organization; philosophy, science & geomorphology 2 The biomantle	1 Soil materials - E5A 240	Summerfield, Ch 1 Summerfield, Ch 2-5
2	7/3	3 Soils and surface processes 4 Weathering and soil landscapes	2 Hillslope processes and surveying (in the field)	Bishop et al., 1980; Paton et al, 1995, Ch 3-4
3	14/3	5 Soil mapping 6 Soil models and classifications	3 Soil description (in the field)	Paton et al., 1995, Ch 1-2. Paton et al., 1995, intro.
4	21/3	7 The Coastal System 8 Waves and beach morphodynamic	4 First field trip preparation: Coastal landforms and processes E5A 240	Short & Wright, 1983
FIRST WEEKEND FIELD TRIP – OPTION 1: Smith's lake/ seal rocks 26th **and** 27th March				
5	28/3	9 No Lecture (Easter Monday) 10 Aeolian processes at the coast	(students may complete Prac 4)	Lees, 2006; Thompson 1981 Lambeck & Chappell, 2001; Thom & Roy, 1985
6	4/4	11 Coastal Evolution and Sea level change 12 First fieldwork report: what to do	5. post-fieldwork data preparation and analysis	Tree in the Woods' (iLearn) Cooke and Doornkamp, 1990 Ch 10
FIRST WEEKEND FIELD TRIP – OPTION 2: Smith's lake/ seal rocks 8th **and** 9th APRIL MID SEMESTER BREAK 9th-25tjh April (2 weeks) FIELD REPORT 1 DUE 10 AM TUESDAY 26th APRIL				
7	25/4	13 No Lecture (Anzac Day) 14 Diversity of rivers	6 The Diversity of Rivers E5A240	Brierley & Fryirs, 2005 Ch 4; Tooth & Nanson, 1995

8	2/5	15 Catchment perspectives and sediment budgets 16 Channel dynamics and magnitude-frequency relationships	7 Flood Hydrology and Stream Power Analysis E5A240	Wolman and Miller, 1960; Wolman and Gerson, 1978; Brierley & Fryirs, 2005 Ch 4 & 5
9	9/5	17 Geomorphic units and river behaviour 18 Floodplain forms and processes	*No practical class*	Nanson and Croke, 1992; Brierley, 1996; Brierley & Fryirs, 2005 Ch 6
10	16/5	19 Fluvial sedimentology and river evolution 20 River responses to human disturbance	8 Second field trip preparation E5A240	Crouch & Blong, 1989
SECOND WEEKEND FIELD TRIP: macdonald river 21st **AND** 22nd MAY				
11	23/5	21 Post field-trip overview 22 Rivers summary and review	9 Second fieldtrip data analysis E5A240	Selby, 1993, Ch 14
12	30/5	23 Mass transport 24 Glacial geomorphology	*No practical class*	Summerfield, 1991 Ch 18 Summerfield, 1991 Ch 15
13	6/6	25. Long-term landscape evolution 26 Unit overview, exam discussion & TEDS	*No practical class*	
FIELD REPORT 2 DUE 9 AM MONDAY 6th JUNE				

EXTERNAL ON-CAMPUS SESSION and FIELDTRIP TIMETABLE

Date	Place	Content	Readings
19th and 20th March	E5A240 9am and field from 9.30am (see Prac 2) to 5pm	Soils and coasts (based on lectures 1 to 8) Day 1: practicals 2 and 4; Day 2: practicals 1 and 3; 4 continued	as above

26th and 27th March OR 8th and 9th April	**FIELDTRIP** – Smith's Lake/Seal Rocks	Coastal geomorphology and evolution. Own transport required to Smith's Lake (Friday PM/ Thursday PM). Finish on site by 4pm Day 2.	see fieldtrip outline
7th May	E5A240 - 9am to 5pm	Catchments and Rivers practicals 6 to 8 (based on lectures 12 to 18)	as above
21st and 22tnd May	**FIELDTRIP** – Macdonald River	Catchment and fluvial processes. Own transport required to Wiseman's Ferry (Friday PM). Finish on site by 4pm Sunday.	see fieldtrip outline

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.

PENALTY FOR LATE ASSIGNMENTS

Overdue assignments attract a penalty of 10 % per day i.e. the mark out of which they are assessed will be reduced by 10% for every day that they are late! ALL assignments must be submitted, however late, otherwise you will be excluded from the unit.

EXTENSION REQUESTS

If you wish to seek an **extension** on the grounds of illness or misadventure, you MUST lodge all supporting documents online at ask.mq.edu.au, however you should advise us of your situation as early as possible. Regular work or study commitments are not a reasonable excuse for lateness; plan your time. However, having said that, please DO NOT hesitate to discuss with the unit staff any circumstances which may be preventing you from completing assignments on time or hindering your study in any other way. From experience, we know that early action is best!

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

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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 5 Design a field research project including data gathering and interpret your own data
- 6 Communicate scientific information and concepts through oral, visual and written formats, including scientific reports

Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2
- 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 outcomes

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections,

correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power

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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2

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

- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 3 Demonstrate knowledge of important concepts of geomorphology
- 4 Demonstrate critical thinking in your reading of the literature and interpretation of your own data
- 5 Design a field research project including data gathering and interpret your own data
- 6 Communicate scientific information and concepts through oral, visual and written formats, including scientific reports

Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1

- Field Report 2
- 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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
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- 3 Demonstrate knowledge of important concepts of geomorphology
- 5 Design a field research project including data gathering and interpret your own data
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2
- 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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2
- 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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air

photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power

- 2 Interpret geomorphic processes from landscape forms and materials in a wide range of environments
- 3 Demonstrate knowledge of important concepts of geomorphology
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2
- 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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2
- 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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
- 5 Design a field research project including data gathering and interpret your own data
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2

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

- 1 Demonstrate skills, including a) describe and sketch soil and sediment sections in the field using standard methods b) survey topography (tape and clino), compute and plot data c) interpret landforms and make a geomorphic map from your interpretation of air photographs, maps or other sources d) draw and interpret stratigraphic sections, correlate profiles and interpret temporal and process relationships e) analyse hydrology using river styles and river planform description/classification, flood return period and stream power
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Assessment tasks

- Practicals (2,3,6,7)
- Field Report 1
- Field Report 2

Changes from Previous Offering

This unit will be offered in 2016 in much the same format as 2015. We always tinker a little to try and make things better and this year there are some changes necessitated by the fall of Easter in term time and accommodation booking problems.

About this Unit and the Environmental Earth Science Major

Students in this unit should read this unit outline carefully at the start of the semester. It contains important information about this unit. If anything in it is unclear, please consult one of the teaching staff in the unit.

UNIT DESCRIPTION- ENVS266 3cp

Understanding how and why the Earth's surface looks and changes in the way it does is fundamental to effective environmental management. This unit examines earth surface processes from a catchment perspective: hill slopes and soils; rivers and floodplains. We draw on Australian and overseas examples from diverse environments to demonstrate how biophysical processes shape our landscape. Students gain practical, laboratory and field based skills that help them interpret the landscape. These are taught in both on campus sessions and weekend field trips. This unit builds on themes introduced in ENVS117 Biophysical Environments and GEOS112 The Planet Earth, and provides a sound conceptual background for students continuing in Environmental Sciences, Environmental Management and programs in ecology, biology, geology and archaeology.

AIMS AND SCOPE

Welcome to ENVS266 Earth Surface Processes. ENVS266 aims to present a unified picture of processes, materials and forms occurring at the surface of the earth. That means how and why the earth's surface looks and behaves as it does and includes the soils, sediments and landforms as well as the processes important to them. Given its antiquity, along with its geographic, tectonic and climatic character, Australia has a distinctive and diverse landscape. The unit therefore draws unashamedly on Australian, and often local, examples which have immediate relevance to Australian environmental problems. The principles and ideas, however, are certainly global and possibly universal (at least applying to the solar system). We aim to give you the 'tools' to understand landscape processes no matter where you are. Time constraints prevent coverage of all aspects of geomorphic enquiry. Emphasis is placed on soil materials, slope, river and coastal environments, although the arid interior of Australia and other exotic places are also examined briefly and the role of human activities is examined. Connections between various aspects of the landscape will be stressed, aiming to provide an integrative perspective on surface processes.

ENVS266 AND THE ENVIRONMENTAL EARTH SCIENCE MAJOR AT MACQUARIE

ENVS266 is the core 200-level unit in Environmental Earth Science and is the main prerequisite for the 300-level units ENVS338 (Environmental Quality and Assessment), ENVS339 (Fluvial Geomorphology and River Management), ENVS340 (Environmental Change) and ENVS341 (Advanced Environmental Earth Science) which comprise the Environmental Earth Science major.

Environmental Earth Science describes the study of the earth’s surface, the diverse physical processes found there and the connections between them. As the name suggests, it lies at the nexus between earth systems and biological systems – it is often concerned with landscapes and the landforms, sediments and soils within them but also, and crucially, the interaction of plants and animals in directing processes and shaping habitat. Environmental Earth Science combines aspects of Geomorphology, Soil Science, Natural Hazards, Environmental Management and Ecology. As a consequence, graduates gain skills essential for management of natural resources, including rural rivers and lands, and highly altered landscapes, including urban environments and mining areas.

Graduates of the Environmental Earth Science program are in a wide range of workplaces including: environmental and geotechnical consultancies, local government (environmental officers), state government departments (Infrastructure, Planning and Natural Resources; Environment and Conservation), National Parks and Wildlife Service, Sydney Water, mining companies (environmental officers), teaching (primary and secondary) and research.

Environmental Earth Science is offered as a major within the Bachelor of Science and Bachelor of Environment. It is also suitable as a component of other specialised programs, including Environmental Management, SIS, Climate Science, Ecology and Environmental Geology. Depending on your own goals you may decide to combine Environmental Earth Science units with other fields e.g. geology, atmospheric science, biology, Spatial Information Science (SIS).

Second year is usually the time you will need to make a decision about your goals and your academic program. Please feel free to discuss your program with any of the staff in the unit at any time during the semester.

You can also find more information about the Environmental Earth Science program and units of study at:

http://handbook.mq.edu.au/2016/Majors/UGMajor/Environmental+Earth+Science

Fieldwork, Field Equipment and Safety

FIELDWORK

Weather: We never cancel fieldtrips for bad weather! You must be prepared to work in the rain with the appropriate clothing. Likewise you should always protect yourself from the sun and dehydration.

Transport: You will need to arrange your own transport for these fieldtrips. Ideally you should arrange to drive to each site with several other students from your practical class.

Arrival: Both fieldtrips start at 8 am on the Saturday morning and therefore you should arrive the previous afternoon. We book accommodation for the Friday and Saturday nights.

Cost: You must cover your own food and transport costs and pay for accommodation. We book accommodation on behalf of the group and you must pay your money to the Cashier using the payment slips found on the iLearn page BEFORE THE TRIP.

Food: You should bring food for breakfast (2 days) and lunch (2 days - to be carried into the field). You should cater for your own dinner on the Friday night and we will organise a BBQ on Saturday night.

Accommodation: Field accommodation is in bunk rooms with communal kitchens, dining, bathroom/toilet and work areas. You should bring (apart from the gear listed below) a sleeping bag, pillow and towel. You can camp, but the cost is the same.

Departure: We aim to leave the field by 4pm on the Sunday afternoon, after all field equipment is returned and the accommodation cleaned. You must advise a staff member before returning home.

Personal Field Equipment: Each student should bring the following aids/comforts on each field

trip:

- sturdy shoes - no sandals, thongs, or high heels! (no visible skin below the ankles)
- water bottle (at least 1 litre)
- wet weather gear - we go whatever the weather!!! Cheap plastic ponchos will not survive walking through scrub.
- hat (with a wide brim, front and back) and sunscreen
- field note book and pencils (see note below)
- calculator, hand lens, small pocket knife
- camera
- your lunch, drinks & snacks for the day - we do not stop at shops!!!
- a back pack to store it all in

FIELD EQUIPMENT YOU SHOULD PURCHASE

- Field notebook
- Hand lens

Each student MUST purchase a small hardcover notebook for use in the field. It should be bound down the spine on the left side, or across the top (but NOT spiral bound). The notebook does not necessarily have to be used only for this unit (you may have used it on previous trips) but it should be good quality and able to withstand a week in the field – in what may be wet conditions. The best, and most expensive, option is a waterproof Rite-in-the-Rain, Markrite or Chartwell notebook. There are several versions but the best options are 1. Geological (Rite in the Rain 540F), with columns, lines and grids (good for sketching and data), included classifications; 2. Small Rite in the Rain notebook (200T) which can be inserted in a hard cover (200C). The first will last you several fieldtrips (and units), the second will probably last you this Unit.

A 10x hand lens can be purchased at the Campus Shop. It can be used in many ENVE, BIOL and GEOS units.

SAFETY IN THE FIELD AND LABORATORY

Any student who has a disability that may limit their participation in field work or that could result in a medical emergency in the field should notify the unit convenor immediately. As a general guide to the level of physical fitness required, you should be able to walk 10 km over open undulating terrain in 3 hours.

Each student must ensure his/her own safety at all times during field excursions.

- Do not undertake fieldwork alone. You must work with at least one other person.
- You must be adequately equipped to undertake fieldwork, including wet weather clothing, warm clothing, hat and sun protection, protective footware (closed toe boots or shoes).
- You should bring a first aid kit if you have one (they will be provided to each group).

- Do not undertake any activity you feel to be unsafe. Discuss with the fieldtrip leader any concerns you have about particular tasks.
- Be watchful of the safety of your fellow students, if they become separated from the group or are at some other risk. Tell the fieldtrip leader as soon as you notice a potentially dangerous situation.

Laboratory work in this unit does not involve hazardous chemicals. Nevertheless, in the laboratory you must wear safe (closed) footwear and generally follow safe practice. Where items of equipment are to be used, do not use them until you have received adequate training.

Geoff Humphreys Prize

All students taking ENVS266 are eligible for the Geoff Humphreys Prize for proficiency in this unit. The prize is for $300 (cash).

Geoff Humphreys was a lecturer in Physical Geography from 1994 to 2007 but had an association with Macquarie extending back to the early 1970s when he began his undergraduate degree here. Geoff was an energetic and enthusiastic researcher and teacher in soil science and geomorphology. His great passion was researching the processes of soil formation, especially the role of the biosphere in soil turnover and movement – bioturbation. Geoff was very much at home in the field and greatly enjoyed teaching students in the bush where it is possible to see processes in action and also the landscape context of detailed measurements.

Geoff was instrumental in devising the curriculum of ENVS266 and taught in the unit for many years. This prize, first awarded in 2007 following Geoff's sudden death, is awarded to the student who shows the most proficiency in this unit which attempts to convey some of Geoff's fascination with how landscapes work.