MACQUARIE University SYDNEY·AUSTRALIA

ENVS339

Fluvial Geomorphology and River Management

S1 Day 2016

Dept of Environmental Sciences

Contents

General Information

Unit convenor and teaching staff
Unit Convenor and Lecturer
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Credit points
3

Prerequisites
39cp including (ENVE266(P) or ENVS266(P) or GEOS266(P))

Corequisites

Co-badged status

Unit description
This unit examines the interaction of river forms and processes, river evolution, impacts of human disturbance to rivers, fluvial sedimentology, and sediment budgets. This provides the knowledge required to use the River Styles framework, and undertake analyses of river health. Emphasis is placed on river processes, management and rehabilitation within an Australian context. During a six day field trip, students apply their skills and knowledge to rivers in coastal New South Wales (such as the Hunter Valley, Illawarra, Manning and Bega catchments). Graduates of this unit are employed in a range of local, state and federal agencies; catchment management authorities; consultancies; and industry. This unit offers the opportunity to interact with stakeholders and employers in professional practice. It allows students the opportunity to apply their learning to practical tasks that are experienced in the workplace.

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:

Interpret causal relationships between fluvial landforms and river processes

Examine and interpret processes of fluvial erosion, transport and deposition

Assess the characteristics of selected Australian river systems

Evaluate human disturbance, modification and management of rivers

Identify and utilize field techniques for the measurement and analysis of river morphology and processes

Interpret sedimentary sequences using fluvial sedimentology

Develop a basic understanding of aquatic geoecology

Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment Tasks

Name	Weighting	Due
Assessment 1	20%	21st March in practical class
Assessment 2	20%	2nd May (11am) FSE Centre
Assessment 3	20%	23rd May (11am) FSE Centre
Exam	40%	Exam Period

Assessment 1

Due: **21st March in practical class**
Weighting: **20%**

See the practical book for further information on this assessment. All the data for this test will be analysed and discussed in the Weeks 2 and 3 practicals. Hence, these pracs will be used to build towards this test. The mid-semester test will cover data analysed in these pracs, your interpretation of that dataset and your knowledge of the content of the compulsory readings.

On successful completion you will be able to:

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment 2

Due: **2nd May (11am) FSE Centre**
Weighting: **20%**

You will receive further information about this report later in the semester, but it will have components on:

- River Styles analysis. If you receive a Pass or better in this assessment you will receive River Styles accreditation for inclusion in your CVs. This report will require you to reflect on approaches, ideas, and understandings about the science of fluvial geomorphology.

On successful completion you will be able to:

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment 3

Due: **23rd May (11am) FSE Centre**
Weighting: **20%**

You will receive further information about this report later in the semester, but it will have components on:

- Sedimentology and human disturbance at the Bretti site. This will be written as a scientific report.

On successful completion you will be able to:

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems

- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology

Exam

Due: **Exam Period**
Weighting: **40%**

There will be a 2 hour final exam for this course that will cover all material from lectures, practicals and fieldtrips. In particular, you will be required to reflect on both theoretical content and the participation activities of this unit.

On successful completion you will be able to:

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Interpret sedimentary sequences using fluvial sedimentology
- Develop a basic understanding of aquatic geoecology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Delivery and Resources

CLASSES

Delivery: Day, internal

The weekly instruction program consists of two hours of lectures and a four hour practical class. A compulsory mid-semester fieldtrip will be held to examine river diversity, river evolution, linkages in catchment, geoecology and river rehabilitation.

Lectures

Lectures are typically 2 hours in length. They 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.

Practical Classes

Practical Classes comprise a 3 hour practical exercise that will be held either in the classroom or in the computer lab. Practicals provide greater depth to the related lecture materials and are designed to assist learning by encouraging your active participation. The pracs and fieldtrips are a compulsory part of the unit and are designed to help you work towards the assessable assignments, to allow you to build on lectures, reading and other material, and to develop generic and specific skills. You will usually complete the practical within the class time. 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 (range of colours preferably), drawing pencils (2B, HB), coloured pencils, ruler, sharpener, eraser, protractor, calculator, field note book.

Fieldwork (PACE activity)

There is a compulsory mid-semester fieldtrip in this unit which constitutes the PACE activity for this unit. This fieldtrip reinforces and extends the content of course and gives you experience in field analyses and interpretation of fluvial environments. The major fieldtrip report is a primary assessment for this course. Equipment and safety issues for field work are described below.

REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

Textbook and required reading for this unit

There is a textbook for this course. Copies are available in the bookshop as well as in the Reserve section of the library.

- Fryirs, K.A. and Brierley (2013) Geomorphic Analysis of River Systems: An Approach to Reading the Landscape. John Wiley and Sons, Chichester, UK.

An accompanying book which you will find useful for some aspects of the course is available in the library:

- Brierley, G.J. and Fryirs, K.A. (2005) Geomorphology and River Management: Applications of the River Styles Framework. Blackwell Publishing, Oxford, UK, 398pp..

Recommended reading for this unit

Recommended weekly readings are also noted in the course timetable.

The following books and papers are recommended as valuable background. The scope of the course is vast and our time is limited, therefore the lectures are of necessity just an overview of each topic. You must read widely, and not just the material required for the assignments. A wealth of scientific information can be gained from Database searches on the University library website. Try GeoRef, Scopus or Web of Science databases!

Books

- Bridge, J.S. 2003. Rivers and Floodplains: Forms, Processes and Sedimentary Record. Blackwell Publishing, Oxford, U.K.
- Brierley, G.J. and Fryirs, K.A. 2005. Geomorphology and River Management: Application

of the River Styles Framework. Blackwell Publishing, Oxford, UK.

- Calow, P. and Petts, G.E. 1994. (Eds.) The Rivers Handbook: Hydrological and Ecological Principles. Blackwell, Oxford, 523 pp.
- Darby, S.E. and Simon, A. 1999. Incised Channels: Processes, Forms, Engineering and Management. John Wiley and Sons, Chichester, UK.
- Downs, P. and Gregory, K.J. 2004. River Channel Management, Arnold, London.
- Gordon, N.D., McMahon, T.A., Finlayson, B.L. Gippel, C.J. and Nathan, R.J. 2004. Stream Hydrology: An Introduction for Ecologists (Second Edition). John Wiley and Sons, Chichester, 429pp.
- Knighton, D. 1998. Fluvial forms and processes : A new perspective. Arnold, London.
- Kondolf, G.M. and Piegay, H. (Eds.) 2003. Tools in Fluvial Geomorphology. John Wiley and Sons, Ltd, Chichester, UK.
- Leopold, L.B., Wolman, M.G. and Millar, J.P. 1964. Fluvial Processes in Geomorphology. Dover Publications, New York.
- Miller, A. and Gupta, A. (Eds.) 1999. Varieties of Fluvial Form. John Wiley and Sons, Chichester.
- Naiman, R.J. and Bilby, R.E. (Eds.) 1998. River Ecology and Management: Lessons from the Pacific Coastal Ecoregion. Springer-Verlag, New York..
- Petts, G. and Calow, P. (Eds.). 1996. River flows and channel forms. Blackwell Science Ltd, Oxford.
- Richards, K. 1982. Rivers: Form & Process in Alluvial Channels. Methuen.
- Rogers, K. and Ralph, T.J. (Eds.) 2010. Floodplain wetland biota in the Murray-Darling Basin: Water and habitat requirements. CSIRO Publishing, Collingwood, Victoria.
- Schumm, S.A. 1977. The Fluvial System. Wiley, New York.
- Thorne, C.R., Hey, R.D. and Newson, M.D. (Eds.) 1997. Applied Fluvial Geomorphology for River Engineering and Management. Wiley, Chichester, UK.
- Tinkler, K.J. and Wohl, E.E. (Eds.) 1998. Rivers over rock: Fluvial processes in bedrock channels. Geophysical Monograph Series 107. American Geophysical Union, Washington D.C.
- Warner RF (1988) Fluvial Geomorphology in Australia. Academic. Press, Sydney.

Selected Journal Articles and Book Chapters

- Baker V.R. 1988. Geological fluvial geomorphology. Geological Society of America Bulletin 100, 1157-1167.
- Brunsden D. & Thornes J.B. 1979. Landscape sensitivity and change, Transactions of the Institute of British Geographers 4, 463-484.

- Brierley G.J. 1996. Channel morphology and element assemblages: A constructivist approach to facies modelling. In Carling P.A. & Dawson M.R. eds. Advances in Fluvial Dynamics and Stratigraphy. John Wiley and Sons.
- Brierley, G.J., Cohen, T, Fryirs, K. & Brooks, A. 1999. Post-European changes to the fluvial geomorphology of Bega catchment, Australia: implications for river ecology. Freshwater Biology 41, 1-10.
- Brierley, G.J. & Fryirs, K.A. 2005. Geomorphology and River Management: Application of the River Styles Framework. Blackwell Publishing.
- Brierley G.J. & Fryirs, K. 2000. River Styles, a geomorphic approach to catchment characterisation: Implications for river rehabilitation in Bega catchment, New South Wales, Australia. Environmental Management 25(6), 661-679.
- Brierley, G.J., Fryirs, K., Outhet, D. & Massey, C. 2002. Application of the River Styles framework as a basis for river management in New South Wales, Australia. Applied Geography 22, 91-122.
- Brookes, A. & Shields, F.D. Jr. (Eds.) 1996. River Channel Restoration: Guiding Principles for Sustainable Projects. John Wiley and Sons, Chichester, pp75-101
- Brooks, A. & Brierley, G.J. 1997. Geomorphic responses of lower Bega River to catchment disturbance, 1851-1926. Geomorphology 18, 291-304.
- Baker V.R. & Twidale C.R. 1991. The re-enchantment of geomorphology. Geomorphology 4, 73-100.
- Bridge, J.S. 2003. Rivers and Floodplains: Forms, Processes and Sedimentary Record. Blackwell Publishing, Oxford, U.K.
- Brunsden D. 1990. Tablets of stone: toward the Ten Commandments in geomorphology. Zeitschrift fur Geomorphologie 79, 1-37.
- Brooks, A.P., Brierley, G.J. & Millar, R.G. 2003. The long-term control of vegetation and woody debris on channel and floodplain evolution: Insights from a paired catchment study in southeastern Australia. Geomorphology 51, 7-29.
- Calow, P. & Petts, G.E. (Eds.) 1994. The Rivers Handbook: Hydrological and Ecological Principles. Blackwell, Oxford, 523 pp.
- Chappell, J. 1983. Thresholds and lags in geomorphologic changes. Australian Geographer 15, 357-366.
- Chessman, B.C., Fryirs, K.A. and Brierley, G.J. 2006. Linking geomorphic character, behaviour and condition to fluvial biodiversity: Implications for river rehabilitation. Aquatic Conservation: Marine and Freshwater Research. 16, 267-288.
- Chorley, R.J. 1969. The drainage basin as the fundamental geomorphic unit. In: Chorley,

R.J. (ed.) Water, Earth, and Man. Methuen and Co. Ltd., Canada.

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- Church, M. 1996. Channel Morphology and Typology. In Petts, G. and Calow, P. (Eds.). River flows and channel forms. Blackwell Science Ltd, Oxford. pp185-202.
- Church, M. & Miles, M.J. 1982. Discussion of processes and mechanisms of bank erosion. In: Hey, R.D., Bathurst, J.C. & Thorne, C.R. (eds.) Gravel-Bed Rivers. Wiley, Chichester, pp. 259-268.
- Costa, J.E. & O'Connor, J.E. 1995. Geomorphically effective floods. In: Costa, J.E., Miller, A.J., Potter, K.W. and Wilcock, P.R. (eds.) Natural and Anthropogenic Influences in Fluvial Geomorphology, Geophysical Monograph 89. American Geophysical Union, Washington D.C, pp. 45-56.
- Crouch R.A. & Blong R.J. 1989. Gully sidewall classification: methods and application. Zeitschrift fur Geomorphologie 33, 291-305.
- Dollar, E.S.J. 2004. Fluvial Geomorphology. Progress in Physical Geography 28(3), 405-450
- Ferguson, R.J. & Brierley, G.J. 1999. Downstream changes in valley confinement as a control on floodplain morphology, lower Tuross River, New South Wales: A constructivist approach to floodplain analysis. In: Miller, A.J. & Gupta, A. (eds.) Varieties of Fluvial Form. John Wiley & Sons, Chichester, pp. 377-407.
- Friedman, J.M., Osterkamp, W.R. & Lewis, W.M. 1996. The role of vegetation and bed-level fluctuations in the process of channel narrowing. Geomorphology 14, 341-351.
- Frissell, C.A., Liss, W.J., Warren, C.E. & Hurley, M.D. 1986. A hierarchical framework for stream habitat classification: Viewing streams in a watershed context. Environmental Management 10, 199-214.
- Fryirs, K. 2003. Guiding principles for assessing geomorphic river condition: Application of a framework in the Bega catchment, South Coast, New South Wales, Australia. Catena 53, 17-52.
- Fryirs, K. & Brierley, G.J. 1998. The character and age structure of valley fills in upper Wolumla Creek catchment, South Coast, New South Wales. Earth Surface Processes and Landforms 23, 271-287.
- Fryirs, K. & Brierley, G.J. 1999. Slope-channel decoupling in Wolumla catchment, N.S.W., Australia: The changing nature of sediment sources following European settlement. Catena 35, 41-63.
- Fryirs, K. & Brierley, G.J. 2000. A geomorphic approach for the identification of river

recovery potential. Physical Geography 21(3), 244-277.

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- Fryirs, K., Brierley, G. J., Preston, N. J. and Spencer, J. 2007 (b). Catchment-scale (dis)connectivity in sediment flux in the upper Hunter catchment, New South Wales, Australia. Geomorphology, 84, 297-316.
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- Hickin, E.J. & Nanson, G.C. 1975. The character of channel migration on the Beaaton River, Northeast British Columbia, Canada. Geological Society of America Bulletin 86, 487-494.
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- Hupp, C.R. and Osterkamp, W.R.. 1996. Riparian vegetation and fluvial geomorphic processes. Geomorphology 14,277-295.
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241-255.

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- Kondolf, G.M. 1997. Hungry water: Effects of dams and gravel mining on river channels. Environmental Management 21(4), 533-551.
- Kondolf G.M. & Micheli E.R. 1995. Evaluating stream restoration projects. Environmental Management 19, 1-15.
- Lane, S.N. & Richards, K.S. 1997. Linking river channel form and process: Time, space and causality revisited. Earth Surface Processes and Landforms 22, 249-260.
- Leopold, L.P. & Wolman, M.G. 1957. River channel patterns: Braided, meandering and straight. U.S. Geological Survey Professional Paper, 282-B.
- Leopold, L.B., Wolman, M.G. & Millar, J.P. 1964. Fluvial Processes in Geomorphology. Dover Publications, New York.
- Lewin, J. & Brindle, B.J. 1977. Confined meanders. In: Gregory, K.J. (ed.) River Channel Changes. John Wiley and Sons, Chichester, pp. 221-233.
- Miller, A.J. 1995. Valley morphology and boundary conditions influencing spatial patterns of flood flow. In: Costa, J.E., Miller, A.J., Potter, K.W. and Wilcock, P.R. (eds.) Natural and Anthropogenic Influences in Fluvial Geomorphology, Geophysical Monograph 89. American Geophysical Union, Washington D.C., pp. 57-81.
- Miller, J.R. and Ritter, J.B. 1996. An examination of the Rosgen classification of natural rivers. Catena 27, 295-299.
- Montgomery, D.R. & Buffington, J.M. 1997. Channel-reach morphology in mountain drainage basins. Geographical Society of America Bulletin 109(5), 596-611.
- Montgomery, D.R. & Piegay, H. 2003. Wood in rivers: interactions with channel morphology and processes. Geomorphology 51(1-3), 1-5.
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- Nanson, G.C. & Croke, J.C. 1992. A genetic classification of floodplains, Geomorphology 4, 459-486.
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- Nanson, G.C. & Young, R.W. 1981a. Downstream reduction of rural channel size with contrasting urban effects in small coastal stream of south eastern Australia. Journal of Hydrology 52, 239-255.
- Nanson G.C. & Young D.M. 1981b. Overbank deposition and floodplain formation on small coastal streams of New South Wales. Zeitshrift fur Geomorphologie 25(3), 332-347.
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- Page, K.J. & Nanson, G.C. 1996. Stratigraphic architecture resulting from Late Quaternary evolution of the Riverine Plain, south-eastern Australia. Sedimentology 43, 927-945.
- Petts, G. & Calow, P. (Eds.). 1996. River flows and channel forms. Blackwell Science Ltd, Oxford.
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- Prosser, I.P., Chappell, J. & Gillespie, R. 1994. Holocene valley aggradation and gully erosion in headwatercatchments, south-eastern highlands of Australia. Earth Surface Processes and Landforms 19, 465-480.
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- Ralph, T.J. & Hesse, P.P. 2010. Downstream hydrogeomorphic changes along the Macquarie River, southeastern Australia, leading to channel breakdown and floodplain wetlands. Geomorphology 118(1-2), 48-64.
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- Rhoads, B.L. 2006. The dynamics of geomorphology reenvisioned. Annals of the Association of American Geographers 96(1), 14-30.
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- Rutherfurd, I. 2000. Some human impacts on Australian stream channel morphology. In Brizga, S. and Finlayson, B. River Management: The Australasian Experience. Chichester, pp11-49.
- Saunders, K.M & Taffs, K.H. 2009. Palaeoecology: A tool to improve the management of Australian estuaries. Journal of Environmental Management 90, 2730-2736.
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- Seidl, M.A., Weissel, J.K. & Pratson, L.F. 1996. The kinematics and pattern of escarpment retreat across the rifted continental margin of SE Australia. Basin Research 12, 301-316.
- Thomas, M.F. 2001. Landscape sensitivity in time and space: An introduction. Catena 42, 83-98.
- Thoms, M.C. & Sheldon, F. 2000. Lowland rivers: an Australian introduction. Regulated Rivers: Research and Management 16, 375¡V383.
- Thomson, J., Taylor, M.P., Fryirs, K.A. and Brierley, G.J. 2001. A geomorphic framework for river characterisation and habitat assessment. Aquatic Conservation: Marine and Freshwater Research 11, 373-389.
- Thorne, C.R. 1982. Processes and mechanisms of river bank erosion. In: Hey, R.D., Bathurst, J.C. and Thorne, C.R. (eds.) Gravel-bed Rivers: Fluvial Processes, Engineering and Management. John Wiley & Sons, Chichester, pp. 227-271.
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- Ward, J.V. 1989. The four-dimensional nature of lotic ecosystems. Journal of the North American Benthological Society 8, 2-8.
- Warner R.F. 1988. Fluvial Geomorphology in Australia. Academic. Press, Sydney.
- Warner, R.F. 1992. Floodplain evolution in a New South Wales coastal valley, Australia: Spatial process variations. Geomorphology 4, 447-458.
- Williams, M.A.J., Adamson, D.A. & Baxter, J.T. 1986. Late Quaternary environments in the Nile and Darling basins. Australian Geographical Studies 24, 128-144.
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- Wolman M.G. & Miller J.P. 1960. Magnitude and frequency of forces in geomorphic processes. Journal of Geology 68, 54-74.

UNIT WEBPAGE AND TECHNOLOGY USED AND REQUIRED

This unit will use: iLearn, computer modelling software

Unit homepage

This unit has a home page that can be accessed through the Macquarie University online facility (ilearn.mq.edu.au). It contains the usual discussion page, mail page, lecture notes page etc. Kirstie and Tim will monitor these pages. As the semester progresses the page will be used to circulate data and reviews etc.

ASSIGNMENT REQUIREMENTS

Assignment requirements

Assessment criteria relevant to all assignments include;

· **ANSWERING THE QUESTION THAT IS ASKED** with a well-developed discussion of the topic, and its implications, that places the topic in a broader context.

Appropriate use and citation of a wide range of relevant literature, including texts, research papers, and grey literature. Note: teaching texts such as Summerfield should not be used.

· Demonstrating good planning with a clear structure, headings, and a logical argument based firmly on the literature cited.

· Presenting a legible paper with correct grammar and spelling, and correct use of professional terminology as appropriate (note that we expect word processing of your assignments. You may hand write, but we won't mark what we can't read).

· Using correct SI units, and correct abbreviations.

· Referring to figures and tables in the text, with full and appropriate titles on each figure and table, irrelevant material is omitted, sources are given.

· Citing references acceptably, correctly and consistently in the text as well as in the reference list, no abbreviations, correct citation of chapters in edited books.

· Staying within the word limit unless otherwise specified.

If you experience difficulty achieving a good standard in your written presentation, please talk to us. The University offers a variety of remedial writing courses and sources of advice that may help you. We emphasise the necessity for clear writing and its importance in your performance assessment.

Assessment of assignments will be based on the Macquarie University scale High Distinction (HD), Distinction (D), Credit (Cr), Pass (P) and Fail (Fail). The markers may choose to further refine these grades by use of a "+" or "-" to indicate work towards the top or the bottom of each grade's band of marks. Feedback will also come in the form of comments written on each student's assignments or emailed directly to you, as well as general commentaries directed to the entire class after all marked assignments have been returned (typically in class or via an email list).

Penalties for late assignments and extension requests

All assignments must be completed and submitted, on time and in full, in order to receive credit. Late assignments must be submitted to the Faculty of Science and Engineering student centre. Penalties for late assignments will be a minimum of 10% per day (including weekend days) or part thereof, beginning at 10 minutes past the DUE HOUR, not at some time later in the day. These deadlines and penalties ***will*** be imposed. Allowing some students to hand assignments in late is unfair to those who meet the deadlines.

The deadlines for assignments are not negotiable. Please take note of the DAYS and TIMES at which work is due. 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 flexible in our requirements if you follow this advice. Only a medical certificate or a letter with appropriate supporting documents outlining other serious, extenuating circumstances can be used to submit an assignment after the due date without penalty. Vague medical certificates are unconvincing – they must indicate *how* the illness impacted your ability to perform the assignment on time. Work commitments are not accepted under any circumstance. You are required to manage your time effectively. If you have commitments that take you away from study you must plan for this in advance as part of an effective individual study plan. You should use the formal DISRUPTION process to receive extensions etc.

Assignment submission

You are required to keep a backup copy of the final version of your assignments (including drawings etc.).

You must staple a cover sheet to the front of the assignment, with all the details completed. This coversheet can be obtained from the link in iLearn. Please be aware of the conditions when signing the declaration, in particular that you have agreed to conform to the university's policy on plagiarism and that you have kept a copy of your assignment.

Assignments must be submitted via the assignment box in the Faculty of Science and Engineering student centre at the times and dates indicated in the table above. If you wish to hand in your work before the specified time, you may give it to the lecturer in charge. If your assignment is late and without a formal extension granted, it must be handed to the course convenor personally (***not*** left under their door).

An after hours submission box is located at the FSE student centre. This box can be used by those who have difficulty handing in assignments by the deadline.

Returning assessment tasks

Staff will endeavour to return your assignments within two teaching weeks of the submission date in the normally scheduled lectures or prac classes. However, please keep in mind that with large assignments and reports it can take significant time to provide constructive feedback. For example, the fieldtrip reports for this unit can take up to one hour each to mark. Assignments not collected in class will be returned to the FSE student centre and students may collect them from there during working hours. Students will be required to show Student ID to collect assignments.

REQUIREMENTS TO COMPLETE THIS UNIT SUCCESSFULLY

Attendance and assignment submission

You are required to attend all lectures, practicals and fieldtrips, submit all pieces of assessment and sit the final exam to receive a Passing grade for this unit.

Examination conditions

The University Examination period this First Half Year begins in June. You are expected to be at the examination at the time and place designated in the University Examination Timetable. The timetable will be available in Draft form approximately eight weeks before the commencement of the examinations and in Final form approximately four weeks before the commencement of the examinations - see http://www.timetables.mq.edu.au/exam. The only exception to not sitting an examination at the designated time is because of documented illness or unavoidable disruption. In these circumstances you should apply for Special Consideration. If a Supplementary Examination is granted as a result of the Special Consideration process the examination will be scheduled after the conclusion of the official examination period. Note that it is Macquarie

University policy not to set early examinations - all students are expected to ensure that they are available until the final day of the official examination period. You are required to download your room and seat number from this website before the exam. You will be required to show your student ID on entering the exam room, so don't forget it! No mobile phones or bags are permitted in the exam room.

WORKLOAD REQUIREMENTS AND COURSE RUBRIC

Workload for units at Macquarie University is based on a minimum of 3 hours per credit point per week to receive a Pass grade (including lectures, practicals and 2 x weeks in mid-semester break). For ENVS339 this means you are expected to work at least 9 hours per week on this course to receive a Pass grade. Obviously this is dependent on the speed at which you learn and your ability to study effectively. You will find you need to spend extra time on different parts of the course content. Depending on when assignments are due, this workload will be spread over the semester. It is critical that you manage your time effectively and work progressively towards assignment submissions well in advance**.** A guide of hours required to receive a Pass grade is outlined below. However, keep in mind, grades are awarded on a demonstration of understanding and ability not on effort!

Activity	Per Teaching Week	# weeks	Hours per Semester
Lectures	2	11	22
Practicals	2	6	12
Assignment 1			10
Assignment 2			12
Assignment 3			25
Fieldtrip			50
Total for semester			**131**
Per week (15 weeks)			**9**

In ENVS339 we expect quality in your assignments and a level of knowledge and comprehension of course content that demonstrates what you have learnt throughout your degree and which sets the foundations for a career in this field. Grades for the unit as a whole will be awarded according to the following general criteria (course rubric).

	Developing	Functional	Proficient	Advanced

General description of the level of attainment	Has not yet reached the desired standard. Limited understanding of required concepts and knowledge. A **fail** grade (or under some circumstances, a conceded pass) would be given.	Has reached basic academic standards. Work has limited translation of concepts and procedures to new contexts unless aided. A **pass** grade would be awarded.	Has completely reached the standards expected. Can work independently in new contexts, adapting procedures to meet the context. Demonstrates awareness of own limitations. A **credit** grade would be awarded.	Has gone beyond the expected standards. Exhibits high levels of independence and can use concepts to generate new ways of completing procedures. Can engage in productive critical reflection. A grade of **distinction** or **high distinction** would be awarded.

UNDERGRADUATE FIELDTRIP WORK, HEALTH AND SAFETY

The safety of you and those around you is our highest priority. Consequently, ALL participants in fieldwork activities are obliged to work and behave appropriately in the field, and to take care to protect their own health, safety and welfare and that of fellow fieldwork participants. You are required to follow instructions from the Fieldwork Leader at all times.

- Prior to fieldwork you will be required to fill in a Participant information form and sign a declaration that you are aware of a range of university policies surrounding fieldwork and work, health and safety. This will be available via a link on the iLearn page.
- Prior to the fieldwork, you must let the Fieldwork Leader know of any allergies, special dietary requirements or medical considerations that may affect your ability to participate in fieldwork. You will need to complete a declaration of a known medical condition form, outlining a treatment plan for your condition. Details of your responsible next of kin must also be provided in case of emergencies.
- You are required to wear and carry clothing and footwear as appropriate to the fieldwork situation. Your Fieldwork Leader will advise you as to what these are prior to the fieldtrip. Irrespective of the activity, footwear must be worn. For terrestrial fieldwork, ankle to knee protection must be worn either in the form of either long trousers or gaiters. For marine fieldwork, appropriate clothing to protect against sunburn and exposure should be worn. For all fieldwork activities, a hat, sunscreen, insect repellent and items to protect against unexpected weather changes, such as rain & cold, are strongly recommended. The Fieldwork Leader reserves the right to exclude anyone that is ill-equipped from the activity.
- If you are taking any medication, please ensure that you take sufficient supplies with you on the field trip. The University's staff are unable, by law, to provide this to you. This includes pain relief, such as panadol or nurofen, cold and flu medication and anti-histamines for allergies.

- If you need to leave the field location for any reason prior to completion of the scheduled activities, you must first inform the Fieldwork Leader.
- In the event of illness or injury, please let the Fieldwork Leader know immediately. All injury's or incidents must be reported via the on-line reporting system: http://staff.mq.edu.au/human_resources/health_and_safety/accident-injury-hazard_reporting
- Alcohol is a significant contributing factor in many incidents and acts of prejudicial conduct. Alcohol must not be consumed when undertaking fieldwork activities or when using a motor vehicle/machinery. After-hours consumption of alcohol is at the discretion of the Fieldwork Leader.
- Anyone acting irresponsibly or in any way deemed to be a danger to themselves or others by the Fieldwork Leader will be required to leave the field trip, return to Sydney at their own expense and report to the Head of Department. The consequences of this may include exclusion from the Unit of study or your Degree program.

For more information, contact:

Russell Field

Fieldwork Manager (Environmental Sciences)

Macquarie University NSW 2109.

(W) 98508341

Unit Schedule

Week	Assessment	Lectures	Practicals & location	Recommended readings
1		Introduction to ENVS339 Lec 1 – Catchment scale analysis of rivers Lec 2 – River diversity and the River Styles® framework	No class. (**Do your homework for next week's practical – plotting cross-sections in excel. Instructions in this prac book.)**	Preface & Ch 1 Fryirs & Brierley (2013) Ch 3 Fryirs & Brierley (2013) Ch 10 Fryirs & Brierley(2013)

2		Lec 3 - Fluid hydraulics, forces and resistance in rivers Lec 4 - Hydraulic geometry, channel shape and bank erosion processes along rivers	PRACTICAL - Catchment morphometrics of rural and urban streams in the Illawarra	Ch 4 (p 53-64) Fryirs & Brierley (2013) Ch 5 Fryirs & Brierley (2013) Ch 7 Fryirs & Brierley (2013) **Read compulsory readings for Assignment 1 (test)**
3		Lec 5 - Sediment transport and sediment budgets Lec 6 – Instream and floodplain geomorphic units	PRACTICAL - Hydraulic modelling of rural and urban streams in the Illawarra	Ch 6 (p81-104) Fryirs & Brierley (2013) Ch 2 (p 9-17) Ch 14 (p 295-309) Fryirs & Brierley (2013) Ch 8 Fryirs & Brierley (2013)
4	**Ass 1:** **Monday 21st March in practical class**	Lec 7 – Floodplain forms and processes Lec 8 – Temporal perspectives in fluvial geomorphology	PRACTICAL - **Mid-semester test on Hydraulic geometry of Illawarra streams**	Ch 9 Fryirs & Brierley (2013) (**these are compulsory readings for fieldtrip report)** Ch 2 Fryirs & Brierley (2013)
5		**EASTER MONDAY - NO CLASS**	**EASTER MONDAY - NO CLASS**	
6		Lec 11 - River behaviour and change Lec 12 – Fluvial sedimentology	PRACTICAL - Pre fieldtrip preparation. Application of the River Styles Framework.	Ch 11 Fryirs & Brierley (2013) Ch 6 (p104-114) Fryirs & Brierley (2013) Ch 9 Brierley & Fryirs (2005) (**these are compulsory readings for fieldtrip report)**
	Mid-semester fieldtrip – 9th - 14th April inclusive			
7		**Anzac Day holiday – No class**	**Anzac Day holiday – No class**	

8	**Ass 2:** **Monday 2nd May by 11am – FoSE Centre**	Lec 11 - Quaternary river evolution Lec 12 - Human disturbance to rivers	Office hours for fieldtrip report (2-4pm)	Ch 12 Fryirs & Brierley (2013) Ch 13 Fryirs & Brierley (2013) (**these are compulsory readings for fieldtrip report**)
9		Lec 13 - Wood, vegetation & seeds in rivers Lec 14 - Assessing river condition & recovery potential	Office hours for fieldtrip report (2-4pm).	Ch 10 & 11 Brierley & Fryirs (2005)
10		Lec 15 - River management Lec 16 - River rehabilitation	Office hours for fieldtrip report (2-4pm).	Ch 1, 12 & 13 Brierley & Fryirs (2005)
11	**Ass 3:** **Monday 23rd May by 11am – FoSE Centre**	Lec 17 – Linking geomorphology and ecology in rivers and wetlands Lec 18 – Assessing change in rivers and wetlands	PRACTICAL - Craven Creek fieldtrip data & exam preparation.	Tooth et al. (2015)
12		Lec 19 – The ebb and flow of dryland rivers Lec 20 – Floodplain wetlands: more than an 'ocean of reeds'	PRACTICAL – Wetlands and their management	Tooth (2000) Ralph & Hesse (2010)
13		Lec – Managing rivers and wetlands of national importance Lec - The future of Australian rivers and wetlands: are 'sustainable yields' possible? TEDS + Exam overview TEDS + Exam overview	No class	DSEWPAC (2010) Australia's RAMSAR sites CSIRO (2008) Water availability in the Murray-Darling Basin

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://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

- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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

- Interpret causal relationships between fluvial landforms and river processes
- Evaluate human disturbance, modification and management of rivers

- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 2
- Assessment 3

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

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Develop a basic understanding of aquatic geoecology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Develop a basic understanding of aquatic geoecology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river

morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Develop a basic understanding of aquatic geoecology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Identify and utilize field techniques for the measurement and analysis of river morphology and processes
- Interpret sedimentary sequences using fluvial sedimentology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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

- Interpret causal relationships between fluvial landforms and river processes
- Examine and interpret processes of fluvial erosion, transport and deposition
- Assess the characteristics of selected Australian river systems
- Evaluate human disturbance, modification and management of rivers
- Interpret sedimentary sequences using fluvial sedimentology
- Develop a basic understanding of aquatic geoecology
- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 1
- Assessment 2
- Assessment 3
- 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 outcome

- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 2

- 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 outcome

- Apply river science to the solution of river management and rehabilitation issues through engagement with community partners.

Assessment tasks

- Assessment 2
- Assessment 3
- Exam

PACE in ENVS339

PACE in ENVS339

PACE stands for Professional and Community Engagement. By connecting students with partner organisations, PACE gives Macquarie students the chance to contribute their academic learning, enthusiasm and fresh perspective to the professional workplace. ENVE339 has been accredited as a Participation unit.

In this unit you will undertake several participation activities. First, is application of the River Styles framework in a field-context. Should you pass the River Styles assessment and adequately reflect on your experience through the evening presentations on the fieldtrip, you will be awarded industry accreditation. Second, you will be undertaking a field experiment with Office of Environment and Heritage staff and also a river management task with Catchment Management Authority staff on the fieldstrip. You will be assessed, and required to reflect on these activities, as well as unit content, as part of the ENVS339 exam.

In requiring students to spend significant time understanding science and how it can be applied to 'real-world' river management problems and conservation programs, students will grow skills that lend to professional and personal judgement and initiative. Finally, ENVS339 fosters a commitment to continuous learning for it promotes exploration of possible future career options, engages students in critically reflective practice, and helps students recognise the importance of future skill development.

As a Participation unit, ENVS339 will be flagged on student transcripts with the symbol 'π' after the unit code and before the unit title. Students can highlight this designation to future employers and academic institutions.

A PACE Activity is an experiential activity allocated to, and undertaken by, a student within a PACE unit which may take place in premises other than the University (usually the Partner Organisation's premises). When working or studying in non-University premises, the primary responsibility for the health and safety of our students becomes that of the Partner Organisation hosting the student. However, as a student, you also have a legal responsibility under the Workplace Health & Safety Act 2011 and the Macquarie University Health & Safety Policy to ensure the health and safety of yourself and of others in the workplace.

Each student has a moral and legal responsibility for ensuring that his or her work environment is conducive to good health and safety, by:

o ensuring that their work and work area is without risk to the health and safety of themselves and others

o complying with the University's and Partner Organisation's Work Health & Safety Policy and Procedures

o reporting hazards and incidents as they occur in accordance with University and Partner Organisation's policy

o actively participating in all health and safety activities and briefing sessions (eg emergency evacuation procedures, site inspections etc)

Each student is also required to advise their Unit Convenor or Faculty PACE Manager as soon as possible when:

o he/she feels unsafe at any stage during the PACE activity

o he/she did not receive a safety induction prior to the commencement of the activity covering: First aid, Fire and emergency evacuation; and Injury/incident reporting

o he/she did not receive any specialised instructions/training necessary to carry out the role

o an incident/accident happens (even when reported to the Partner Organisation/supervisor and managed by them)

Non-compliance with the above may result in withdrawal of the student from the PACE Activity.

Students in the Faculty of Science should also be familiar with Faculty-specific practices as appropriate:

http://web.science.mq.edu.au/intranet/ohs/

PACE Team Support

PACE units in Science and Engineering, their Unit Convenors, and their students, are supported by a PACE Team within the Faculty. Throughout the unit offering, members of the Team may be in contact with students to provide or collect information. Similarly, if students have any questions about PACE, they can email: pace.science@mq.edu.au

The Faculty of Science and Engineering also has its own PACE webpages:

http://science.mq.edu.au/pace/

The main PACE webpage can be found at:

http://mq.edu.au/about_us/offices_and_units/professional_and_community_engagement/

PACE-related policies, procedures, and other important information

PACE - Managing Other Commitments Procedure: to outline the University's approach to an absence or other form of disruption during the session due to a student undertaking a PACE activity.

http://www.mq.edu.au/policy/docs/participation_activity/procedure.html

Policy regarding PACE and the AHEGS statement:As a PACE unit, ENVS339 will be flagged on student transcripts with the symbol 'π' after the unit code and before the unit title. Students can highlight this designation to future employers and academic institutions as the following definition, which details the value of such units, will also be included after the list of units and before Special Achievements, Recognition and Prizes (if included) or the Key to Grading:

π: Units marked with a π are designated PACE units. These units provide students with an opportunity to learn through practical experience and make a valuable contribution to the community by applying knowledge and skills acquired at the University.

Ethical Practice and PACE:Ethical considerations feature heavily in the PACE Initiative. As ambassadors of the University, students are expected to engage with the wider community in a responsible and ethically informed manner that respects the rights of individuals, communities and the environment. This expectation applies to all PACE activities regardless of their nature. Ethical practice involves negotiating the ethical complexities of the context with which you are working. This involves critically thinking about issues of power, hierarchy, culture and position, and about the potential risks of your work and interactions with others, immediate and over time. It is important to ensure that risks are mitigated and experiences are enriching and worthwhile for all those involved.

In addition to the role of students as ambassadors, partners must conform to the University's ethical standards; PACE activities must be aligned with the wellbeing of people and planet;there are research-based PACE activities as well as collaborative research with partners; and, the way in which everybody's PACE experiences are captured and shared must be ethical.If a student ever feels that unethical behaviour has occurred during a PACE activity, they should consult with their Unit Convenors and/or the Faculty PACE staff immediately. Further, any students whose PACE activity will involve research must consult with their convenor prior to commencement to confirm whether or not research ethics permission is required.

PACE and IP:Students enrolled in PACE units may be working with external industry partners. Although it is uncommon, during some activities Intellectual Property may be created and there may be some instances when the partner requires the assignment of IP. For more information please refer the PACE Activity Handbook and feel free to consult with the Unit Convenor or Faculty PACE Team.

PACE Grants and Prizes: There are several ways in which PACE might support students financially to undertake PACE activities. PACE students are also eligible to apply for the prestigious Prof.Judyth Sachs PACE Prizes.

http://students.mq.edu.au/courses/professional_and_community_engagement/pace_grants/

http://students.mq.edu.au/courses/professional_and_community_engagement/pace_prizes/

Unit specific Graduate Capabilities

Unit specific graduate capabilities

Graduate capability	Indicators of development in ENVE339
1. A student who has *Discipline Specific Knowledge and Skills*	· Identifies, understands and uses discipline-specific language in oral and written work · Constructs a critical evaluations current scientific knowledge on fluvial forms, processes, behaviour, evolution, human disturbance and management. · Collects, analyses and adequately explains and interprets scientific data from the field or other primary sources. · Understands the basics of aquatic geoecology and how it is linked to fluvial geomorphology. · Is able to confidently identify fluvial forms, evaluate river process and behaviour, interpret river evolution.
2. A student who has *Critical, Analytical and Integrative Thinking*	· Applies scientific method in an advanced manner. · Competently accesses, uses, critiques and synthesises scientific literature. · Can select appropriate techniques to characterize and analyses fluvial sediments. · Interprets empirical data to assess fluvial processes and behaviour. · Competently uses and interrogates computer modeling software to analyse complex data sets. · Uses advanced techniques to present scientific data in the form of maps, tables and figures in assignments. · Can apply key concepts and theories in fluvial geomorphology to river management practice. · Applies geo-scientific principles to understanding fluvial systems and can confidently make recommendations on how the rivers can be better managed. · Competently uses information technology applications for analyzing numerical and spatial information.

3. A student who has *Problem Solving and Research Capability*	· Designs, plans and carries out accurate field data collection and observations individually and within groups. · Develops hypotheses for testing. · Understands complex theories in fluvial geomorphology. · Applies knowledge of fluvial geomorphology to river conservation and rehabilitation issues. · Designs, describes and interprets maps, databases, graphs and tables. · Analyses data using appropriate graphical and numerical techniques. · Draws conclusions from the results of data analysis, while recognizing limitations of data sets. · Uses case studies effectively as a research method. · Demonstrates competence in field safety and response.
4. A student who is *Creative and Innovative*	· Develops means of presenting and synthesizing data in a creative way. · Develops new ideas and theories and can construct a cohesive argument on specific topics in fluvial geomorphology and management. · Consider river management issues from a range of new perspectives. · Generates alternative options and innovative solutions to environmental problems. · Discerns gaps and limitations of fluvial geomorphology knowledge.
5. A student who has *Effective Communication*	· Has well developed scientific report writing skills, including a clear writing style with correct grammar and spelling. · Displays advanced discussion and presentation skills. · Presents ideas clearly with supporting evidence from the literature. · Communicates the results of analysis clearly and effectively. · Presents and defends an argument in a verbal and written context. · Uses technical and discipline-specific language and terms. · Demonstrates well developed scientific citation and referencing skills. · Presents data in a range of numerical, graphical and map formats. · Engages in online and verbal communication with peers on issues in the fluvial geomorphology.
6. A student who is an *Engaged and Ethical Local and Global citizen*	· Engages with issues of fluvial degradation and sustainability. · Can appraise principal threats, and examine responses to fluvial degradation and management. · Engages in scientifically honest use of group data with integrity. · Critically evaluates different theoretical approaches to analyzing fluvial environments and can apply these theories and concepts to river management. · Identifies how Australian rivers behave, evolve and are managed, and places this in an international context.

7. A student who is *Socially and Environmentally Active and Responsible*	· Articulates future strategies that will meet the needs for river management in Australia. · Is able to work with peers to collect data collaboratively. · Can effectively manage a group to maximize attainment of goals (e.g. time management). · Works proactively and accepts responsibility for quality data analysis and interpretation. · Accepts responsibility for actions and respects procedures on fieldtrips. · Helps peers in areas of individual strength.
8. A student who has *Capable of Professional and Personal Judgement and Initiative*	· Adequately follows instructions, particularly in field contexts. · Applies and adapts scientific knowledge to the real world. · Competently undertakes projects of complex nature. · Judges which management approach is most appropriate for a particular situation. · Evaluates alternative solutions to the same problem. · Develops evidence-based approaches based on fluvial geomorphology to assessment and management of river systems. · Reflects on feedback and how personal experiences to improve competency in fluvial geomorphology and river management.
9. A student who has *Commitment to Continuous Learning*	· Demonstrates effective time management skills by submitting good quality assignments on time and attending all lectures and practical classes. · Reflects on their own performance by evaluating feedback from teaching staff and integrating that into subsequent assessment tasks. · Shows evidence of reading scientific literature beyond that presented as recommended reading. · Reflects on how knowledge can be applied in other contexts.
