



## 2009 MARINE SCIENCE

### UNITS OF STUDY & DESCRIPTIONS

Refer to the **2009 Faculty of Science Handbook & Handbook Update** online for additional details  
[http://www.usyd.edu.au/handbooks/handbooks\\_admin/science.shtml](http://www.usyd.edu.au/handbooks/handbooks_admin/science.shtml)

Intermediate Units	Semester offered	Unit of Study
BIOL2018	S2	Introduction to Marine Biology
BIOL2918	S2	Introduction to Marine Biology (Adv)
GEOS2115	S1	Oceans, Coasts & Climate Change
GEOS2915	S1	Oceans, Coasts & Climate Change (Adv)
NTMP	S2 intensive	Options may be available in intermediate year (limited)
<b>Senior Units</b>		
BIOL3006	S1	Ecological Methods
BIOL3906	S1	Ecological Methods (Adv)
BIOL3007	S2	Ecology
BIOL3907	S2	Ecology (Adv)
BIOL3008	S2 intensive	Marine Field Ecology
BIOL3908	S2 intensive	Marine Field Ecology (Adv)
BIOL3011	S1	Ecophysiology
BIOL3911	S1	Ecophysiology (Adv)
BIOL3013	S1	Marine Biology
BIOL3913	S1	Marine Biology (Adv)
GEOS3009	S1	Coastal Environments & Processes
GEOS3909	S1	Coastal Environments & Processes (Adv)
GEOS3014	S2	GIS in Coastal Management
GEOS3914	S2	GIS in Coastal Management (Adv)
GEOS3102	S1	Global Energy & Resources
GEOS3802	S1	Global Energy & Resources (Adv)
GEOS3103	S2	Sedimentary & Environmental Geology
GEOS3803	S2	Sedimentary & Environmental Geology (Adv)
GEOS3104	S2	Geophysical Methods
GEOS3804	S2	Geophysical Methods (Adv)
GEOS3018	S1	Rivers: Science, Policy & Management
GEOS3918	S1	Rivers: Science & Management (Adv)
NTMP3001	S2 intensive	Coral Reef Ecosystems
NTMP3003	S2 intensive	Fisheries Biology & Management (not offered in 2009)
NTMP3004	S2 intensive	Aquaculture
NTMP3005	S2 intensive	Coastal Management

## MARINE SCIENCE UNITS OF STUDY ~ INTERMEDIATE LEVEL

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### BIOL2018 - Introduction to Marine Biology

S2

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL2018\\_Introduction\\_to\\_Marine\\_Biology\\_1217](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL2018_Introduction_to_Marine_Biology_1217)

This unit will describe some of the ways in which the properties of the oceans affect marine organisms. It also introduces coral reefs and other marine ecosystems, together with their productivity, biological oceanography, the reproductive biology of marine organisms, and marine biological resources. The practical elements will provide the core skills and techniques that will equip students to perform laboratory and field studies in marine biology. The unit will introduce appropriate methodologies for the collection, handling and analysis of data; the scientific principles underlying experimental design; and the effective communication of scientific information.

**Teacher/Coordinator:** Dr Adele Pile ([apile@bio.usyd.edu.au](mailto:apile@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** 2x1hr lectures per week. 6x1hr tutorials, 1x8hr field trip, 3x4hr field trips and 1x3hr practical.

**Pre-requisites:** BIOL (1001 or 1911 or 1101 or 1901) and 6 additional credit points of Junior Biology (BIOL/MBLG/EDUH). 12 credit points of Junior Chemistry (or for BSc (Marine Science) students 6 credit points of Junior Chemistry and either an additional 6 credit points of Junior Chemistry or 6 credit points of Junior Physics).

**Prohibitions:** BIOL2918, MARS (2006 or 2906 or 2007 or 2907).

**Assumed knowledge:** 12 credit points of Junior Biology; MARS2005.

**Assessment:** Two hour theory exam, four written reports.

**Textbooks:**

- Castro, P. and Humber, M. 2007. Marine Biology 4th Ed. McGraw-Hill Higher Education, Sydney.

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### BIOL2918 - Introduction to Marine Biology (Adv)

S2

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL2918\\_Introduction\\_to\\_Marine\\_Biology\\_Adv\\_1226](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL2918_Introduction_to_Marine_Biology_Adv_1226)

This unit has the same objectives as BIOL2018, Introduction to Marine Biology, and is suitable for students wishing to pursue aspects from the unit in greater depth. Students taking this unit will participate in alternatives to some elements of the ordinary level course and will be required to pursue the unit objectives by more independent means. Specific details of the unit will be announced in meetings, during the first week of teaching.

**Teacher/Coordinator:** Dr Adele Pile ([apile@bio.usyd.edu.au](mailto:apile@bio.usyd.edu.au))

**Credit points:** 6.

**Session:** Semester 2

**Classes:** 2x1hr lectures per week. 6x1hr tutorials, 1x8hr field trip, 3x4hr field trips and 1x3hr practical.

**Pre-requisites:** Distinction average in BIOL (1001 or 1911 or 1101 or 1901) and 6 additional credit points of Junior Biology (BIOL/MBLG/EDUH). 12 credit points of Junior Chemistry (or for BSc (Marine Science) students 6 credit points of Junior Chemistry and either an additional 6 credit points of Junior Chemistry or 6 credit points of Junior Physics. These requirements may be varied and students with lower averages should consult the Unit Executive Officer.

**Prohibitions:** BIOL2018, MARS (2006 or 2906 or 2007 or 2907).

**Assumed knowledge:** 12 credit points of Junior Biology; MARS2005.

**Assessment:** Two hour theory exam, four written reports.

**Textbooks:** As for BIOL2018

*Note: Entry is restricted and selection is made from applicants on the basis of previous performance.*

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## GEOS2115 - Oceans, Coasts and Climate Change

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS2115 Oceans Coasts and Climate Change 3859](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS2115 Oceans Coasts and Climate Change 3859)

This Unit of Study introduces core concepts about how the formation of ocean basins and their influence on climate govern the development of coasts and continental margins. These concepts provide a framework for understanding the geographic variation of coasts, continental shelves and sediment accumulations in the deep ocean. Ocean-basin evolution is explained in terms of movements within the Earth's interior and how these movements determine the geometry of ocean basins, and their alpine counterparts, which interact with the global circulation of the ocean and atmosphere. Affects of this interaction on energy regimes and hydrology are described in accounting for regional controls that govern supply and dispersal of sediments on continental margins and in ocean basins. These controls include effects on wave climates, wind-driven currents and tidal regimes. These controls also govern environmental conditions determining development of coral reefs and other ecosystems that play a key role in marine sedimentation. The Unit of Study systematically outlines how these factors have played out with climate change to produce the beaches, dunes, estuaries and deltas we see today, as well as the less familiar deposits hidden beneath the sea. The Unit also outlines how knowledge of responses to climate change in the past allow us to predict responses of coasts to accelerated climate change occurring now and in the future due to the industrial greenhouse effect. Overall therefore, the Unit aims to provide familiarity with fundamental phenomena central to the study of marine geoscience, introduced through process-oriented explanations. The Unit of Study is structure around problem-based project work, for which lectures provide the theoretical background.

**Teacher/Coordinator:** Assoc Prof Peter Cowell ([cowell@usyd.edu.au](mailto:cowell@usyd.edu.au))

Prof Dietmar Müller ([dietmar@usyd.edu.au](mailto:dietmar@usyd.edu.au))

Dr Jody Webster ([jodyw@usyd.edu.au](mailto:jodyw@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** 26 x 1 hour lectures 6 x 1 hour workshops 1 x 8 hour field work 1 x 24 hour field school (3 days, Easter break)

**Pre-requisites:** 48 credit points from Junior Units of Study

**Prohibitions:** GEOS2915, MARS2006

**Assumed knowledge:** At least one of (GEOG1001, GEOL1001, GEOL1002, GEOS1003, GEOS1903, ENVI1002, GEOL1902, GEOL1501)

**Assessment:** 3 x web-based on-line reports (30% of total marks), 1 seminar presentation: field school (20% of total marks) 1 x 2 hour exam (50% of total marks)

**Textbooks:**

- Thurman, HV and Trujillo, AP. Introductory Oceanography. Pearson, Prentice-Hall, 10th Edition. 2004.

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## GEOS2915 - Oceans, Coasts and Climate Change (Adv)

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS2915\\_Oceans\\_Coasts\\_and\\_Climate\\_Change\\_Adv\\_3867](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS2915_Oceans_Coasts_and_Climate_Change_Adv_3867)

This unit has the same objectives as GEOS2115 and is suitable for students who wish to pursue aspects of the subject in greater depth. Entry is restricted and selection is made from the applicants on the basis of their performance to date. Students who elect to take this unit will participate in alternatives to some aspects of the standard unit and will be required to pursue independent work to meet unit objectives.

**Teacher/Coordinator:** Assoc Prof Peter Cowell ([cowell@usyd.edu.au](mailto:cowell@usyd.edu.au))  
Prof Dietmar Müller ([dietmar@usyd.edu.au](mailto:dietmar@usyd.edu.au))  
Dr Jody Webster ([jodyw@usyd.edu.au](mailto:jodyw@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** 26 x 1 hour lectures, 1 x 16 hour field school (2 days, Easter break), 2 x 1 hour workshops, 1 x 4 hour field work, 1 x 4 hour field work, 5 x 3 hours lab work

**Pre-requisites:** Distinction average in 48 credit points from Junior units of study

**Prohibitions:** GEOS2115, MARS2006

**Assumed knowledge:** (GEOG1001, GEOL1001, GEOL1002, GEOS1003, GEOS1903, ENVI1002, GEOL1902, GEOL1501)

**Assessment:** Field School Report (20%), Field and Lab report (45%), 2 web based online reports (15% of total marks), one 1 hour exam: subset of GEOS2115 (20% of total marks)

**Textbooks:** None: Online reading materials are provided via Fisher Library.

## MARINE SCIENCE UNITS OF STUDY ~ SENIOR LEVEL

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### BIOL3006 - Ecological Methods

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3006\\_Ecological\\_Methods\\_1227](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3006_Ecological_Methods_1227)

This unit will consider ecology as a quantitative, experimental and theoretical science. It is concerned with the practical skills and philosophical background required to explore questions and test hypotheses in the real world. Application of ecological methods and theory to practical problems will be integrated throughout the unit of study. Lectures will focus on sound philosophical and experimental principles, drawing on real examples for demonstration of concepts, and will be useful as one basis for informed conservation and management of natural populations and habitats. Practical methods will include effective samplings, determining patterns of distribution and abundance, estimating ecological variables, and statistical analysing field data. Computer simulations and analyses will be used where appropriate.

**Teacher/Coordinator:** Dr Clare McArthur (UEO) ([claremc@usyd.edu.au](mailto:claremc@usyd.edu.au))  
Assoc Prof Ross Coleman ([ross.coleman@bio.usyd.edu.au](mailto:ross.coleman@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lecture and one 3 hour laboratory per week.

**Pre-requisites:** 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.

**Prohibitions:** BIOL3906, MARS3102

**Assumed knowledge:** BIOL (2011 or 2911 or 2012 or 2912) or PLNT (2002 or 2902).

**Assessment:** One 2 hour exam 40%, practical assignments (including calculations, reports and reviews) 60%.

**Textbooks:**

- Dytham, C. 2003. Choosing and using statistics. A biologist's guide. 2nd edition. Blackwell Science. Melbourne.
- Field, A. 2005. Discovering statistics using SPSS. 2nd edition. SAGE Publications, London.
- Quinn, GP and Keough, MJ. 2002. Experimental Design and Data Analysis for Biologists. 1st edition. Cambridge University Press. Cambridge.
- Underwood, AJ 1997. Experiments in Ecology: their logical design and interpretation using analysis of variance. Cambridge University Press. Cambridge.

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### BIOL3906 - Ecological Methods (Advanced)

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3906\\_Ecological\\_Methods\\_Advanced\\_1247](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3906_Ecological_Methods_Advanced_1247)

This unit has the same objectives as BIOL3006 Ecological Methods, and is suitable for students who wish to pursue certain aspects in greater depth. Entry is restricted, and selection is made from the applicants on the basis of their previous performance. Students taking this unit of study will participate in alternatives to some elements of the standard course and will be required to pursue the objectives by more independent means. Specific

details of this unit of study and assessment will be announced in meetings with students in week 1 of semester 1. This unit of study may be taken as part of the BSc (Advanced) program.

**Teacher/Coordinator:** Dr Clare McArthur (UEO) ([claremc@usyd.edu.au](mailto:claremc@usyd.edu.au))  
Assoc Prof Ross Coleman ([ross.coleman@bio.usyd.edu.au](mailto:ross.coleman@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 3 hour laboratory per week

**Pre-requisites:** Distinction average in 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.

**Prohibitions:** BIOL3006, MARS3102

**Assumed knowledge:** BIOL (2011 or 2911 or 2012 or 2912) or PLNT (2002 or 2902).

**Assessment:** One 2 hour exam 40%, practical assignments (including calculations, reports and reviews) 60%.

**Textbooks:** As for BIOL3006

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## **BIOL3007 - Ecology**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3007\\_Ecology\\_1228](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3007_Ecology_1228)

This unit explores the dynamics of ecological systems, and considers the interactions between individual organisms and populations, organisms and the environment, and ecological processes. Lectures are grouped around four dominant themes: Interactions, Evolutionary Ecology, The Nature of Communities, and Conservation and Management. Emphasis is placed throughout on the importance of quantitative methods in ecology, including sound planning and experimental designs, and on the role of ecological science in the conservation, management, exploitation and control of populations. Relevant case studies and examples of ecological processes are drawn from marine, freshwater and terrestrial systems, with plants, animals, fungi and other life forms considered as required. Students will have some opportunity to undertake short term ecological projects, and to take part in discussions of important and emerging ideas in the ecological literature.

**Teacher/Coordinator:** Dr Dieter Hochuli ([dieter@bio.usyd.edu.au](mailto:dieter@bio.usyd.edu.au))  
Dr Clare McArthur ([claremc@usyd.edu.au](mailto:claremc@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** Two 1 hour lecture and one 3 hour laboratory per week

**Pre-requisites:** 12 credit points of Intermediate Biology; or 6 credit points of Intermediate Biology and 6 credit points of ENVI2111 or MARS2006 ; or 12 credit points of MARS units, including MARS2006

**Prohibitions:** BIOL3907, MARS3102

**Assumed knowledge:** Although not prerequisites, knowledge obtained from BIOL3006/3906, and BIOL3008/3908 and/or BIOL3009/3909, is strongly recommended.

**Assessment:** One 2hr exam, presentations, essay, project report.

**Textbooks:**

- Ecology: an Australian Perspective (2003) Edited by P. Attiwill and B. Wilson. Oxford University Press.

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**BIOL3907 - Ecology (Advanced)****S2**[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3907\\_Ecology\\_Advanced\\_1248](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3907_Ecology_Advanced_1248)

This unit has the same objectives as BIOL3007 Ecology, and is suitable for students who wish to pursue certain aspects in greater depth. Entry is restricted, and selection is made from the applicants on the basis of their previous performance. Students taking this unit of study will participate in alternatives to some elements of the standard course and will be required to pursue the objectives by more independent means. Specific details of this unit of study and assessment will be announced in meetings with students in week 1 of semester 2. This unit of study may be taken as part of the BSc (Advanced) program.

**Teacher/Coordinator:** Dr Dieter Hochuli ([dieter@bio.usyd.edu.au](mailto:dieter@bio.usyd.edu.au))  
Dr Clare McArthur ([claremc@usyd.edu.au](mailto:claremc@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** Two 1 hour lectures and one 3 hour laboratory per week.

**Pre-requisites:** Distinction average in 12 credit points of Intermediate Biology; or 6 credit points of Intermediate Biology and 6 credit points of ENVI2111 or MARS2006; or 12 credit points of Intermediate MARS units, including MARS2006

**Prohibitions:** BIOL3007, MARS3102

**Assumed knowledge:** Although not prerequisites, knowledge obtained from BIOL3006/3906, and BIOL3008/3908 and/or BIOL3009/3909, is strongly recommended. Students entering this unit of study should have achieved Distinction average.

**Assessment:** One 2hr exam, presentations, essay, project report.

**Textbooks:** As for BIOL3007

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**BIOL3008 - Marine Field Ecology****S2**[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3008\\_Marine\\_Field\\_Ecology\\_1229](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3008_Marine_Field_Ecology_1229)

This field course provides a practical introduction to the experimental analysis of marine populations and assemblages. Students gain experience using a range of intertidal sampling techniques and develop a detailed understanding of the logical requirements necessary for manipulative ecological field experiments. No particular mathematical or statistical skills are required for this subject. Group experimental research projects in the field are the focus of the unit during the day, with lectures and discussion groups about the analysis of experimental data and current issues in experimental marine ecology occurring in the evening.

**Teacher/Coordinator:** Assoc Prof Ross Coleman ([ross.coleman@bio.usyd.edu.au](mailto:ross.coleman@bio.usyd.edu.au))

**Credit points:** 6**Session:** Semester 2 Intensive (*Note: Dates: 2 - 9 July 2009*)**Classes:** Intensive 8 day-field course held in the pre-semester break.**Pre-requisites:** 12 credit points of Intermediate Biology, or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.**Prohibitions:** BIOL3908, MARS3102.**Assumed knowledge:** BIOL (3006 or 3906). Prior completion of one of these units is very strongly recommended.**Assessment:** Discussion groups, research project proposal, biodiversity survey report, data analysis and checking, research project report.**Textbooks:**

No textbook is prescribed but Coastal Marine Ecology of Temperate Australia. Eds. Underwood, A.J. & Chapman, M.G. 1995. University of New South Wales Press, provides useful background reading

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**BIOL3908 - Marine Field Ecology (Advanced)****S2**[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3908\\_Marine\\_Field\\_Ecology\\_Advanced\\_1249](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3908_Marine_Field_Ecology_Advanced_1249)

This unit has the same objectives as Marine Field Ecology BIOL3008, and is suitable for students wishing to pursue certain aspects of marine field ecology in a greater depth. Entry is restricted and selection is made from applicants on the basis of past performance. Students taking this unit of study will be expected to take part in a number of additional tutorials after the field course on advanced aspects of experimental design and analysis and will be expected to incorporate these advanced skills into their analyses and project reports. This unit may be taken as part of the BSc(Advanced).

**Teacher/Coordinator:** Assoc Prof Ross Coleman ([ross.coleman@bio.usyd.edu.au](mailto:ross.coleman@bio.usyd.edu.au))**Credit points:** 6**Session:** Semester 2 Intensive (*dates: 2 - 9 July 2009*)**Classes:** One 8 day field course held in the pre-semester break, plus four 1 hour tutorials during semester 2.**Pre-requisites:** Distinction average in 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.**Prohibitions:** BIOL3008, MARS3102.**Assumed knowledge:** BIOL (3006 or 3906). Prior completion of one of these units is very strongly recommended.**Assessment:** Discussion groups, research project proposal, biodiversity report, data analysis and checking, research project report.**Textbooks:** As for BIOL 3008.

*Note: Dates: 2 - 9 July 2009. Plus four 1 hour tutorials during semester 2.*

## BIOL3011 – Ecophysiology

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3011\\_Ecophysiology\\_1232](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3011_Ecophysiology_1232)

Ecophysiology is a conceptually based unit of study that covers physiological interactions between organisms and their environments. The unit focuses on the evolution of physiological capacities and how these may explain the ecology and biogeography of organisms. Lectures are based on the current primary literature. Lecturers have active research programs on the topics they cover and will present original research findings where appropriate. Examples are mainly from insects, vertebrates, and marine organisms. As part of the practical component, students design their own original research projects to be conducted during a week-end long field trip, and during self-directed laboratory sessions.

**Teacher/Coordinator:** Assoc Prof Seebacher (UEO) ([fseebach@bio.usyd.edu.au](mailto:fseebach@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 4 hour laboratory per week.

**Pre-requisites:** 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.

**Prohibitions:** BIOL3911

**Assumed knowledge:** BIOL (2012 or 2912 or 2016 or 2916) or PLNT (2003 or 2903).

**Assessment:** One 1.5 hour exam, field trip seminar, laboratory report.

*Note: The completion of 6 credit points of MBLG units is highly recommended.*

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## BIOL3911 - Ecophysiology (Advanced)

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3911\\_Ecophysiology\\_Advanced\\_1252](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3911_Ecophysiology_Advanced_1252)

Ecophysiology (Advanced) shares the same lectures as BIOL 3011 Ecophysiology, but it includes an independent project in place of the laboratory report (equivalent of 30% of Ecophysiology). The content and nature of the independent project varies and students are encouraged to design their own project.

**Teacher/Coordinator:** Assoc Prof Seebacher (UEO) ([fseebach@bio.usyd.edu.au](mailto:fseebach@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 4 hour laboratory per week.

**Pre-requisites:** Distinction average in 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006. These requirements may be varied and students with lower averages should consult the Unit Executive Officer.

**Prohibitions:** BIOL3011

**Assumed knowledge:** BIOL (2012 or 2912 or 2016 or 2916) or PLNT (2003 or 2903)

**Assessment:** One 1.5 hour exam, field trip seminar, independent project report.

*Note: The completion of 6 credit points of MBLG units is highly recommended.*

## BIOL3013 - Marine Biology

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3013 Marine Biology 1234](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3013%20Marine%20Biology%201234)

We will examine in detail processes that are important for the establishment and maintenance of marine communities. Lectures will expose students to the key ideas, researchers and methodologies within selected fields of marine biology. Laboratory sessions will complement the lectures by providing students with hands-on experience with the organisms and the processes that affect them. Students will develop critical analysis skills while examining the current literature.

**Teacher/Coordinator:** Dr Adele Pile ([apile@bio.usyd.edu.au](mailto:apile@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 4 hour laboratory per week.

**Pre-requisites:** 12 credit points of Intermediate Biology, or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.

**Prohibitions:** BIOL3913

**Assumed knowledge:** BIOL 2018 or MARS2006

**Assessment:** Practical reports, paper criticisms and other assignments

*Note: The completion of 6 credit points of MBLG units is highly recommended.*

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## BIOL3913 - Marine Biology (Advanced)

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=BIOL3913 Marine Biology Advanced 1254](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=BIOL3913%20Marine%20Biology%20Advanced%201254)

Qualified students will participate in alternative components of the BIOL3103 Marine Biology unit. The content and nature of these components may vary from year to year.

**Teacher/Coordinator:** Dr Adele Pile ([apile@bio.usyd.edu.au](mailto:apile@bio.usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 4 hour laboratory per week.

**Pre-requisites:** Distinction average in 12 credit points of Intermediate Biology; or MARS2006 and 6 credit points of Intermediate Biology; or 12 credit points of Intermediate MARS units, including MARS2006.

**Prohibitions:** BIOL3013

**Assumed knowledge:** BIOL2018 or MARS2006

**Assessment:** Practical reports, paper criticisms and other assignments.

*Note: The completion of 6 credit points of MBLG units is highly recommended.*

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## GEOS3009 - Coastal Environments & Processes

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3009 Coastal Environments Processes 3876](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3009_Coastal_Environments_Processes_3876)

Australian coastal environments are dynamic systems responding to input sediments and processes as well as solid boundary conditions. The unit focuses on high-energy wave and wind dominated coastal systems that include the beach-surf zone, dunes, barriers, carbonate (coral reef) environments and their Holocene/Quaternary evolution. The regional impact of waves, tides, embayments, and other environmental parameters in controlling morphology and deposits are addressed. The practical program uses real data sets collected during recent research programs and during two field excursions which address issues specifically relevant to Australia's coastline. The excursions include one 2 day weekend field trip and one 5 day field trip to the Great Barrier Reef in the mid semester break.

Note: Students will incur costs in attending the excursions. Alternative work will be provided if students cannot attend the 5 day field trip.

**Teacher/Coordinator:** Assoc Prof Gavin Birch ([g.birch@usyd.edu.au](mailto:g.birch@usyd.edu.au))  
Dr Jody Webster ([jodyw@usyd.edu.au](mailto:jodyw@usyd.edu.au))  
Dr Ana Vila-Concejo ([a.vilaconcejo@usyd.edu.au](mailto:a.vilaconcejo@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lectures and one 2 hour practical per week; weekend excursion.

**Pre-requisites:** 6 credit points of (GEOS2115 or GEOS2915 or BIOL2018) or 6 credit points of Intermediate Geoscience\* units and 6 credit points of other Intermediate Units

**Prohibitions:** GEOS3909, MARS3003, MARS3105

**Assessment:** One 2 hour exam, two 1500 word reports.

**Textbooks recommended:**

- Short, A D (ed) Beach and Shoreface Morphodynamics. John Wiley & Sons, Chichester. 1999.
- Course notes will be available from the Photocopy Centre.

*Note: \* Geoscience is the disciplines of Geography, Geology and Geophysics.*

*Textbooks*

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## GEOS3909 - Coastal Environments and Processes (Adv)

S1

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3909 Coastal Environments and Processes Adv 3904](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3909_Coastal_Environments_and_Processes_Adv_3904)

Advanced students will complete the same core lecture material as for GEOS3009 but will carry out more challenging projects, practicals, assignments and tutorials.

**Teacher/Coordinator:** Assoc Prof Gavin Birch ([g.birch@usyd.edu.au](mailto:g.birch@usyd.edu.au))  
Dr Jody Webster ([jodyw@usyd.edu.au](mailto:jodyw@usyd.edu.au))  
Dr Ana Vila-Concejo ([a.vilaconcejo@usyd.edu.au](mailto:a.vilaconcejo@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Three 1 hour lectures, two 3 hour practicals per week, fieldwork.

**Pre-requisites:** Distinction average in (12 credit points of Intermediate Geoscience\* units) including 6 credit points of (GEOS2115 or GEOS2915 or BIOL2018) or 6 credit points of Intermediate Geoscience\* units and 6 credit points of other Intermediate Units

**Prohibitions:** GEOS3009, MARS3003, MARS3105

**Assessment:** One 2 hour exam, two 1500 word reports.

*Note: A distinction average in prior Geography or Geology units is normally required for admission. This requirement may be varied and students should consult the unit of study coordinator.*

*Note: \* Geoscience is the disciplines of Geography, Geology and Geophysics.*

*Textbooks*

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## GEOS3014 - GIS in Coastal Management

S2

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3014\\_GIS\\_in\\_Coastal\\_Management\\_3877](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3014_GIS_in_Coastal_Management_3877)

Coastal Management is about how scientific knowledge is used to support policy formulation and planning decisions in coastal environments. The course links coastal science to policy and practice in management of estuaries, beaches and the coastal ocean. The principles are exemplified through specific issues, such as coastal erosion, pollution, and impacts of climate-change. The issues are dealt with in terms of how things work in nature, and how the issues are handled through administrative mechanisms. These mechanisms involve planning strategies like Marine Protected Areas and setback limits on civil development in the coastal zone. At a practical level, the link between science and coastal management is given substance through development and use of 'decision-support models'. These models involve geocomputing methods that entail application of simulation models, remotely sensed information, and Geographic Information Systems (GIS). The course therefore includes both principles and experience in use of these methods to address coastal-management issues. (It thus also involves extensive use of computers.) Although the focus is on the coast, the principles and methods have broader relevance to environmental management in particular, and to problem-solving in general. That is, the course has vocational relevance in showing how science can be exploited to the benefit of society and nature conservation.

**Teacher/Coordinator:** Dr Eleanor Bruce ([e.bruce@usyd.edu.au](mailto:e.bruce@usyd.edu.au))

Assoc Prof Peter Cowell ([cowell@usyd.edu.au](mailto:cowell@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** Two 1 hour lectures and one 3 hour practical per week.

**Pre-requisites:** 6 credit points of (GEOS2115 or GEOS2915 or BIOL2018) or 6 credit points of Intermediate Geoscience\* units and 6 credit points of other Intermediate Units

**Assessment:** One 2 hour exam, two project reports, quizzes.

**Textbooks:**

- Burrough, PA and McDonnell, RA. Principles of Geographical Information Systems: Spatial information systems and geostatistics. Oxford University Press. Oxford. 1998.

*Note: \* Geoscience is the disciplines of Geography, Geology and Geophysics.*

## **GEOS3914 - GIS in Coastal Management (Advanced)**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3914](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3914) GIS in Coastal Management Advanced 3907

Advanced students will complete the same core lecture material as for GEOS3014 but will carry out more challenging projects, practicals, assignments and tutorials.

**Teacher/Coordinator:** Dr Eleanor Bruce ([e.bruce@usyd.edu.au](mailto:e.bruce@usyd.edu.au))  
Assoc Prof Peter Cowell ([cowell@usyd.edu.au](mailto:cowell@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** Two hours of lectures, one 3 hour practical per week comprising one 1 hour practical demonstration and one 2 hour practical.

**Pre-requisites:** Distinction average in 12 credit points of intermediate geography or geology units or GEOS (2115 or 2915) and BIOL (2018 or 2918). School permission required for enrolment.

**Prohibitions:** GEOS3014, MARS3104

**Assessment:** One 2 hour exam, project work, two practical-based project reports, fortnightly progress quizzes.

*Note: School permission required for enrolment.*

*Note: A distinction average in prior Geography, Geology or Marine Science units of study is normally required for admission. This requirement may be varied and students should consult the unit of study coordinator.*

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## **GEOS3102 - Global Energy and Resources**

**S1**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3102](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3102) Global Energy and Resources 3885

This unit examines the processes that form energy and mineral resources, outlines the characteristics of major fossil fuel and metal ore deposits and introduces the principles that underpin exploration strategies used to discover and develop geological resources. The unit will focus on a variety of topics including: coal; petroleum formation and migration, hydrocarbon traps and maturation; precious metal, base metal and gemstone deposit types; and exploration strategies. An integrated approach will relate tectonic processes through time to the formation of fossil fuel and mineral provinces. Practical exercises will introduce students to the techniques used to identify economically viable geological resources using a variety of exercises based on actual examples of resource exploration drawn from both the petroleum and minerals industry. An excursion to active and historic mining sites in NSW will complement the practical studies.

**Teacher/Coordinator:** Dr Derek Wyman ([d.wyman@usyd.edu.au](mailto:d.wyman@usyd.edu.au))  
Assoc Prof Gavin Birch ([g.birch@usyd.edu.au](mailto:g.birch@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** two 1 hour lectures and one 2 hour tutorial/practicals per week.

**Pre-requisites:** GEOS(2114 or 2914) and GEOS(2124 or 2924); or 24 credit points of Intermediate Science units of study and GEOS1003 with permission of the Head of School

**Prohibitions:** GEOS3802, 3003, 3903, 3004, 3904, 3006,3906, 3017 and 3917

**Assumed knowledge:** GEOS 2114 and GEOS2124

**Assessment:** one 2 hour exam, practical and field reports

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### **GEOS3802 - Global Energy and Resources (Adv)**

**S1**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3802](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3802) Global Energy and Resources Adv 3896

This unit has the same objectives as GEOS3102 and is suitable for students who wish to pursue aspects of the subject in greater depth. Entry is restricted and selection is made from the applicants on the basis of their performance to date. Students that elect to take this unit will participate in alternatives to some aspects of the standard unit and will be required to pursue independent work to meet unit objectives. Specific details for this unit of study will be announced in meetings with students in week 1 of semester.

**Teacher/Coordinator:** Dr Derek Wyman ([d.wyman@usyd.edu.au](mailto:d.wyman@usyd.edu.au))

Assoc Prof Gavin Birch ([g.birch@usyd.edu.au](mailto:g.birch@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** two 1 hour lectures and one 3 hour tutorial/practical class per week

**Pre-requisites:** Distinction in GEOS(2114 or 2914) and GEOS(2124 or 2924); Students who have a credit average for all Geoscience units may enrol in this unit with the permission of the Head of School.

**Prohibitions:** GEOS3102, GEOS3003, GEOS3903, GEOS3004, GEOS3904, GEOS3006, GEOS3906, GEOS3017, and GEOS3917

**Assumed knowledge:** GEOS2114 and GEOS2124

**Assessment:** one 2 hour exam, practical and field reports

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### **GEOS3103 - Environmental & Sedimentary Geology**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3103](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3103) Environmental Sedimentary Geology 3886

Sediments and sedimentary rocks cover most of the Earth's surface, record much of the Earth's geological history and host important resources such as petroleum, coal, water and mineral ores. The aim of this unit is to provide students with the skills required to examine, describe and interpret sediments and sedimentary rocks for a variety of different purposes. Specific focuses of the unit will be on identifying the recent or ancient environment in which sedimentary materials were deposited; the techniques used to identify anthropogenic pollution of modern sediments; and an assessment of natural hazards commonly associated with the formation of sediment bodies such as landslides and deep marine slides. On completion of this unit students will be familiar with the natural processes that form, modify, pollute and lithify sediments and the recognition and management of the

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environmental hazards associated with sediment bodies. A variety of sedimentary settings will be examined including fluvial, alluvial, lacustrine, marginal marine and deep marine environments. The various controls on the sedimentary record such as climate and sea-level change, as well as diagenesis and geochemical cycles will also be discussed. Practical exercises will require students to examine global datasets, determine the properties of sedimentary rocks, as well as collect and interpret their own field data. The course is relevant to students interested in petroleum or mineral exploration, environmental and engineering geology as well as marine geoscience.

**Teacher/Coordinator:** Dr Tom Hubble ([t.hubble@usyd.edu.au](mailto:t.hubble@usyd.edu.au))  
Dr Adriana Dutkiewicz ([a.dutkiewicz@usyd.edu.au](mailto:a.dutkiewicz@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** two 1 hour lectures and one 3 hour tutorial/practical class per week.

**Pre-requisites:** GEOS(2124 or 2924) and GEOS(2115 or 2915; 2111 or 2911 or 2114 or 2914 or 2113 or 2913); or GEOS(1003 or 1903) and 24 credit points of intermediate Science units of study with permission of the Head of School

**Prohibitions:** GEOS3803

**Assumed knowledge:** GEOS1003, GEOS2124

**Assessment:** one 2 hour exam, practical and field reports

**Textbooks:** Course notes will be available from the Copy Centre and an appropriate set of reference texts will be placed on special reserve in the library.

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## **GEOS3803 - Environmental & Sedimentary Geology (Adv)**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3803](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3803) Environmental Sedimentary Geology Adv 3897

This unit has the same objectives as GEOS3103 and is suitable for students who wish to pursue aspects of the subject in greater depth. Entry is restricted and selection is made from the applicants on the basis of their performance to date. Students that elect to take this unit will participate in alternatives to some aspects of the standard unit and will be required to pursue independent work to meet unit objectives. Specific details for this unit of study will be announced in meetings with students in week 1 of semester.

**Teacher/Coordinator:** Dr Tom Hubble ([t.hubble@usyd.edu.au](mailto:t.hubble@usyd.edu.au))  
Dr Adriana Dutkiewicz ([a.dutkiewicz@usyd.edu.au](mailto:a.dutkiewicz@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** two 1 hour lectures and one 3 hour tutorial/practical class per week.

**Pre-requisites:** Distinctions in 12 credit points from GEOS(2115 or 2915) or GEOS(2114 or 2914) or GEOS(2124 or 2924); Students who have a credit average for all Geoscience units may enrol in this unit with permission of the Head of School

**Prohibitions:** GEOS3103

**Assumed knowledge:** GEOS1003, GEOS2124

**Assessment:** one 2 hour exam, practical and field reports

**Textbooks:** Course notes will be available from the copy centre and appropriate set of reference texts will be placed on special reserve in the library.

## **GEOS3104 - Geophysical Methods**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3104\\_Geophysical\\_Methods\\_3887](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3104_Geophysical_Methods_3887)

This unit introduces the common geophysical methods used to investigate the interior of the Earth and focuses on the techniques used for mineral and hydrocarbon exploration and production. Applications of these methods to problems in global geophysics will also be examined with an emphasis on their use in marine and terrestrial environments. On completion of this unit students will have developed a thorough understanding of the commonly used geophysical methods and will be able to evaluate and critically assess most forms of geophysical data as well as be able to actively participate in geophysical explorations. The unit is aimed at students with interests in land-based and marine resource exploration, plate tectonics, internal earth structure, and near-surface investigations of groundwater resources and environmental pollution. Students wishing to specialise in the field and become professional geophysicists will normally need to expand upon the geophysics knowledge gained from this unit and either complete an honours project or progress to postgraduate coursework in this field.

**Teacher/Coordinator:** Prof Peter Hatherly ([p.hatherly@usyd.edu.au](mailto:p.hatherly@usyd.edu.au))  
Prof Dietmar Muller ([dietmar@usyd.edu.au](mailto:dietmar@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** two 1 hour lectures and one 3 hour tutorial/practical class per week.

**Pre-requisites:** 24 credit points of intermediate Science units of study or (12 credit points from GEOS(2115 or 2915) or GEOS(2114, 2914) or GEOS(2124, 2924))

**Prohibitions:** GEOS3804, GEOS3003, GEOS 3903, GEOS3006, GEOS3906, GEOS3016, GEOS3916, GEOS3017, GEOS3917

**Assumed knowledge:** GEOS2114 and GEOS2124

**Assessment:** one 2 hour exam, practical and field reports

**Textbooks:** Class notes will be supplied through the University copy Centre. Geophysical textbooks held in the library provide adequate additional information that supports the class notes.

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## **GEOS3804 - Geophysical Methods (Advanced)**

**S2**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3804\\_Geophysical\\_Methods\\_Advanced\\_3898](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3804_Geophysical_Methods_Advanced_3898)

This unit has the same objectives as GEOS3104 and is suitable for students who wish to pursue aspects of the subject in greater depth. Entry is restricted and selection is made from the applicants on the basis of their performance to date. Students that elect to take this unit will participate in alternatives to some aspects of the standard unit and will be required to pursue independent work to meet unit objectives. Specific details for this unit of study will be announced in meetings with students in week 1 of semester.

**Teacher/Coordinator:** Prof Peter Hatherly ([p.hatherly@usyd.edu.au](mailto:p.hatherly@usyd.edu.au))  
Prof Dietmar Muller ([dietmar@usyd.edu.au](mailto:dietmar@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 2

**Classes:** two 1 hour lectures and one 3 hour tutorial/practical class per week.

**Pre-requisites:** Distinction in GEOS2114 or GEOS2914 and GEOS2124 or GEOS2924;

Students who have a credit average for all Geoscience units may enrol in this unit with the permission of the Head of School

**Prohibitions:** GEOS3104, GEOS3003, GEOS3903, GEOS3006, GEOS3906, GEOS3016, GEOS3916, GEOS3017, GEOS3917

**Assessment:** one 2 hour exam, practical and field reports

**Textbooks:** Class notes will be supplied through the University Copy Centre. Geophysical textbooks held in the library provide adequate additional information that supports the class notes.

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### **GEOS3018 - Rivers: Science, Policy and Management**

**S1**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3018\\_Rivers\\_Science\\_Policy\\_and\\_Management\\_3881](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3018_Rivers_Science_Policy_and_Management_3881)

The unit of study is concerned with understanding the functioning of river catchments from both natural science and social science perspectives, at a variety of scales. The catchment as a morphodynamic process-response system is addressed with an emphasis on the relationships between processes and landform entities. Similarly, relationships within social, economic, and political systems are explored within the catchment context, with particular emphasis on the interactions between the social system and bio-physical system. Empirical context for the unit will primarily be drawn from the Murray-Darling, Mekong, and Hawkesbury-Nepean catchments. Fieldwork in the latter is integral to the unit of study.

**Teacher/Coordinator:** Dr Mel Neave ([m.neave@usyd.edu.au](mailto:m.neave@usyd.edu.au))

**Credit points:** 6.

**Session:** Semester 1

**Classes:** Two 1 hour lectures, one 1 hour tutorial, two 4 hour practicals per week; fieldwork

**Pre-requisites:** (24 credit points of Intermediate units of study including 6 credit points of Intermediate Geography units of study) or ((MARS2005 or MARS2905) and (MARS2006 or MARS2906)) or 6 credit points of (GEOS2115 or GEOS2915 or BIOL2018).

**Prohibitions:** GEOS3918

**Assessment:** One 2 hour exam, two 1500 word essays

**Textbooks:**

- Gordon, et al. Stream Hydrology: An Introduction for Ecologists. 2004.

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### **GEOS3918 - Rivers: Science and Management (Adv)**

**S1**

[http://www.usyd.edu.au/courses/?uos=1&uos\\_sef\\_id=GEOS3918\\_Rivers\\_Science\\_and\\_Management\\_Adv\\_3911](http://www.usyd.edu.au/courses/?uos=1&uos_sef_id=GEOS3918_Rivers_Science_and_Management_Adv_3911)

Advanced students will complete the same core lecture material as for GEOS3018, but will carry out more challenging projects, practicals, assignments and tutorials.

**Teacher/Coordinator:** Dr Mel Neave ([m.neave@usyd.edu.au](mailto:m.neave@usyd.edu.au))

**Credit points:** 6

**Session:** Semester 1

**Classes:** Two 1 hour lecture, one 1 hour tutorial, two 4 hour practicals per week, fieldwork.

**Pre-requisites:** Distinction average in (24 credit points of Intermediate units of study including 6 credit points of Intermediate Geography units of study) or ((MARS2005 or MARS2905) and (MARS2006 or MARS2906)) or (GEOS2115 or GEOS2915 or BIOL2018).

**Prohibitions:** GEOS3018

**Assessment:** One 2 hour exam, two 1500 word essays.

## National Tropical Marine Program (NTMP)      S2 only

NTMP courses can be done during the intermediate year, but entry is competitive (merit based) because of limited places. Preference is given to senior students. Intermediate year enrolments often do the CZM and Coral Reef Unit of Study. The Aquaculture course will undoubtedly be filled with senior years - perhaps 1 or 2 places could be available to high merit second year student if places become available. Fisheries may be offered in 2010. (See further below for list of available Units.)

### NTMP3001 Coral Reef Ecosystems

Coral Reef Ecosystems is an intensive course that will be held on One Tree Island Tropical Research Station on the Great Barrier Reef. The course focuses on the dominant taxa in reef environments and linkages between them. Emphasis is given to corals, other reef associated invertebrates (e.g. echinoderms and plankton) and fishes. Ecological and physiological aspects of key organisms are explored. Aspects covered include: distribution of corals; coral bleaching; coral symbionts and the health of the corals based on photosynthetic activity; predation on corals; the input of plankton to reefs; and, the role of fishes in reef environments. Department permission required for enrolment due to quota.

*Unit Coordinator:* Professor Maria Byrne ([mbyrne@anatomy.usyd.edu.au](mailto:mbyrne@anatomy.usyd.edu.au))

- Assumed Knowledge: General concepts in Biology
- Prerequisites: 12 credit points of Intermediate Science including 6 credit points of Biology
- Offered: July

**Classes:** Fieldwork, 80 hours block mode.

**Assessment:** By participation in field school and report.

**Texts:** course notes provided

Suggested Text: The Great Barrier Reef, Biology, Environment and Management. P. Hutchings, O. Hoegh-Guldberg and M. J. Kingsford (eds) 2008 CSIRO Publishing, Collingwood

### NTMP3003 Fisheries Biology & Management

Fisheries Biology and Management is an intensive course that will be held at the tropical research station on Orpheus Island in the Great Barrier Reef. The course focuses on approaches to quantitative fisheries biology in tropical marine environments. Emphasis is given to sampling design and hypothesis testing, underwater visual census surveys, fishery surveys, assessments of habitat types, and tagging and trapping of organisms. Most field aspects will be covered while diving and data storage will be dealt with at the end of each day. The assessment will focus on the manipulation of data and reporting. This course may be offered in 2010

*Unit Coordinator:* Professor Maria Byrne ([mbyrne@anatomy.usyd.edu.au](mailto:mbyrne@anatomy.usyd.edu.au))

- Assumed Knowledge: General concepts in Biology
- Prerequisites: 12 credit points of Intermediate Science including 6 credit points of Biology
- Offered: July

**Classes:** Fieldwork, 80 hours block mode.

**Assessment:** by participation in field school and report.

**Texts:** course book provided.

## NTMP3004 Aquaculture

Aquaculture is an intensive course that will be held at the tropical research station on Orpheus Island in the Great Barrier Reef. The course focuses on approaches to aquaculture in tropical marine environments. Emphasis is given to aquaculture of tropical invertebrates (especially bivalves and clams) and fishes. Some aspects of the course may also be done using the aquarium system on campus at James Cook University. Aspects covered include: the design of aquarium facilities; water quality; rearing of algae; rearing of planktonic food; stocking densities; and, growth and genetics of the target species. This course is offered in 2009

**Unit Coordinator:** Professor Maria Byrne ([mbyrne@anatomy.usyd.edu.au](mailto:mbyrne@anatomy.usyd.edu.au))

- Assumed Knowledge: General concepts in Biology.
- Prerequisites: 12 credit points of Intermediate Science including 6 credit points of Biology.
- Offered: July.

**Classes:** Fieldwork, 80 hours block mode.

**Assessment:** by participation in field school and report.

**Texts:** course book provided.

## NTMP3005 Coastal Management

This course examines the impacts of human activities on coastal and marine environments. It explores the complex relationships among the ecological and social values of these environments and outlines strategies and tools for their management. This is an intensive course that will be held at the Sydney Harbour Institute of Marine Science at Chowder Bay.

**Unit Coordinator:** Professor Andy Short ([a.short@usyd.edu.au](mailto:a.short@usyd.edu.au))

- Prerequisites: GEOS2115/2915 plus 12 credit points of Intermediate Science including 6 credit points of Biology.
- Offered: July.

**Classes:** Fieldwork, 80 hours block mode.

**Assessment:** by participation in field school and report.

**Texts:** course book provided.

## Degree Majors

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### Major in Marine Geoscience

For a major in Marine Science Geoscience, the minimum requirement is 24 credit points from Senior units listed in this subject area. Intermediate units leading to a Major in Marine Geoscience are 12 credit points of intermediate GEOS Units or 6 credit points of intermediate GEOS Units and 6 credit points of either BIOL2018 or BIOL2918.

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<a href="#">GEOS3009</a>	Coastal Environments & Processes
<a href="#">GEOS3909</a>	Coastal Environments & Processes (Adv)
<a href="#">GEOS3014</a>	GIS in Coastal Management
<a href="#">GEOS3914</a>	GIS in Coastal Management (Adv)
<a href="#">GEOS3102</a>	Global Energy & Resources
<a href="#">GEOS3802</a>	Global Energy & Resources (Adv)
<a href="#">GEOS3103</a>	Sedimentary & Environmental Geology
<a href="#">GEOS3803</a>	Sedimentary & Environmental Geology (Adv)
<a href="#">GEOS3104</a>	Geophysical Methods
<a href="#">GEOS3804</a>	Geophysical Methods (Adv)
<a href="#">GEOS3018</a>	Rivers: Science, Policy & Management
<a href="#">GEOS3918</a>	Rivers: Science & Management (Adv)

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### Major in Marine Biology

For a major in Marine Science Biology, the minimum requirement is 24 credit points from Senior units listed in this subject area. Intermediate units leading to a Major in Marine Bioscience are 12 credit points of intermediate BIOL Units that include BIOL2018 or BIOL2918.

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<a href="#">BIOL3006</a>	Ecological Methods
<a href="#">BIOL3906</a>	Ecological Methods (Adv)
<a href="#">BIOL3007</a>	Ecology
<a href="#">BIOL3907</a>	Ecology (Adv)
<a href="#">BIOL3008</a>	Marine Field Ecology
<a href="#">BIOL3908</a>	Marine Field Ecology (Adv)
<a href="#">BIOL3011</a>	Ecophysiology
<a href="#">BIOL3911</a>	Ecophysiology (Adv)
<a href="#">BIOL3013</a>	Marine Biology
<a href="#">BIOL3913</a>	Marine Biology (Adv)

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### Major in Marine Science

For a major in Marine Science, the minimum requirement is 24 credit points from Senior Units listed under the Major in Marine Geosciences, the Major in Marine Biology and the National Tropical Marine Program of which at least 6 credit points must be BIOL Units and at least 6 credit points must be GEOS Units.

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