



2011 MARINE SCIENCE

UNITS OF STUDY & DESCRIPTIONS

Refer to the **2010 Faculty of Science Handbook** & Handbook Update online for additional details
http://ses.library.usyd.edu.au/bitstream/2123/5407/1/science_2010.pdf

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)
Senior Units		
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)
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, Policy & Management (Adv)
NTMP3001	S2 intensive	Coral Reef Ecosystems
NTMP3003	S2 intensive	Fisheries Biology & Management
NTMP3004	S2 intensive	Aquaculture
NTMP3005	S2 intensive	Coastal Management

MARINE SCIENCE UNITS OF STUDY ~ INTERMEDIATE LEVEL

BIOL2018 - Introduction to Marine Biology

S2

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: Assoc Prof Ross Coleman (ross.coleman@sydney.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:

- Levinton, J. (2009) Marine Biology: Function, Biodiversity and Ecology (3rd ed). Oxford University Press.

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

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: Assoc Prof Ross Coleman (ross.coleman@sydney.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.

GEOS2115 - Oceans, Coasts and Climate Change

S1

http://www.geosci.usyd.edu.au/units_of_study/us_geos2115.shtml

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, and related environmental processes responsible for physical hazards. 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 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 by gradual change the coasts we see today, as well as the less familiar deposits hidden beneath the sea and coastal lands. These gradual changes are compared to the sudden effects of more catastrophic geophysical events. The Unit thereby outlines how knowledge of responses to climate change in the past allow us to predict environmental responses to accelerated climate change occurring now and in the future due to the industrial greenhouse effect, but places these responses into perspective against natural hazards that already occur. Overall therefore, the Unit aims to provide familiarity with fundamental phenomena central to the study of marine geoscience and environmental impacts, introduced through process-oriented explanations. The Unit of Study is structured around GIS-based practical sessions and problem-based project work, for which lectures provide the theoretical background.

Teacher/Coordinator: Dr Maria Seton (maria.seton@sydney.edu.au)

Assoc Prof Peter Cowell (peter.cowell@sydney.edu.au)

Dr Ana Vila Concejo (ana.vilaconcejo@sydney.edu.au)

Dr Jody Webster (jody.webster@sydney.edu.au)

Credit points: 6

Session: Semester 1

Classes: 26 one-hour lectures, 4 one hour workshops, 1 two hour field work, 6 two hour practical classes

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: Web-based on-line reports (30%). One lab report (20%). One 2-hour exam (50%)

Textbooks:

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

GEOS2915 - Oceans, Coasts and Climate Change (Adv)

S1

http://www.geosci.usyd.edu.au/units_of_study/us_geos2115.shtml

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: Dr Maria Seton (maria.seton@sydney.edu.au)

Assoc Prof Peter Cowell (peter.cowell@sydney.edu.au)

Dr Ana Vila Concejo (ana.vilaconcejo@sydney.edu.au)

Dr Jody Webster (jody.webster@sydney.edu.au)

Credit points: 6

Session: Semester 1

Classes: 26 one hour lectures, 4 one hour workshops, one 2 hour field work, six 2 hour practical classes.

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: Web-based on-line reports (30%), one lab report (20%), one 2-hour exam (50%).

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

MARINE SCIENCE UNITS OF STUDY ~ SENIOR LEVEL

BIOL3006 - Ecological Methods

S1

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) (clare.mcarthur@sydney.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.

BIOL3906 - Ecological Methods (Advanced)

S1

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 (clare.mcarthur@sydney.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

BIOL3007 – Ecology

S2

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.hochuli@sydney.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:

- Begon M, Townsend CR, Harper JL (2005) Ecology, From individuals to ecosystems. Wiley-Blackwell.
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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.hochuli@sydney.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

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@sydney.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

BIOL3908 - Marine Field Ecology (Advanced)

S2

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@sydney.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

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 Frank Seebacher (frank.seebacher@sydney.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.

BIOL3911 - Ecophysiology (Advanced)

S1

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 Frank Seebacher (frank.seebacher@sydney.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

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 William Figueira (will.figueira@sydney.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.

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 William Figueira (will.figueira@sydney.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.

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%20Coastal%20Environments%20Processes%203876)

The aim of this course is to introduce students to a variety of Coastal Environments and the major physical and chemical processes which control the morphodynamic evolution of these systems. The course offers a unique opportunity of learning the full spectrum of marine

sedimentary environments from siliciclastic, temperate, highly urbanised and impacted estuarine ecosystems to carbonate, tropical, pristine and undeveloped/protected coastal and continental margin environments. The course includes field work at two of the Universities research stations, i. e. at Chowder Bay, Port Jackson and One Tree Island on the Great Barrier Reef (GBR). The two parts of the course comprise physical and chemical processes in estuarine and carbonate-dominated coastal and continental margin environments. The first part of the course covers basic morphodynamics and physical processes in estuarine environments and focuses on methods of assessing the magnitude of human impact on these valuable and sensitive ecosystems and judging the risks of sedimentary contaminants on benthic animals. A major part of this section is a project aimed at assessing the environmental status of a major embayment of the Sydney estuary. The second part of the course covers the basic morphodynamics and processes impacting carbonate-dominated coastal and continental margin environments. The focus is on carbonate reefal and margin systems and their geologic and biologic responses to past, present and future environmental changes. These systems will be also be studied in the field at The University of Sydney One Tree Island Research Station and on Heron Island in the GBR. This fieldtrip is not compulsory but is strongly recommended as it will expose students first hand to a pristine, world class coral reef system. Students who are unable participate in the GBR field trip will be given an alternative assignment.

Teacher/Coordinator: Assoc Prof Gavin Birch (gavin.birch@sydney.edu.au)
Dr Jody Webster (jody.webster@sydney.edu.au)
Dr Ana Vila-Concejo (ana.vilaconcejo@sydney.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 Intermediate Geoscience units and 6 further credit points of Intermediate Geoscience or 6 credit points of Physics or Mathematics or Information Technology or Engineering units or MARS2005 or MARS2905 and MARS2006 or MARS2906

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 Copy Centre.

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

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

Teacher/Coordinator: Assoc Prof Gavin Birch (gavin.birch@sydney.edu.au)
Dr Jody Webster (jody.webster@sydney.edu.au)
Dr Ana Vila-Concejo (ana.vilaconcejo@sydney.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 Intermediate Geoscience units and 6 further credit points of Intermediate Geoscience or 6 credit points of Physics or Mathematics or Information Technology or Engineering units or MARS2005 or MARS2905 and MARS2006 or MARS2906

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 Copy Centre.

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.

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

GEOS3014 - GIS in Coastal Management

S2

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. The coastal environments and processes that are more relevant to coastal management including: rocky coasts; beaches, barriers and dunes; and coral reefs will also be introduced. 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 examining how science can be exploited to the benefit of society and nature conservation.

Teacher/Coordinator: Dr Eleanor Bruce (eleanor.bruce@sydney.edu.au)

Dr Ana Vila-Concejo (ana.vilaconcejo@sydney.edu.au)

Credit points: 6

Session: Semester 2

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

Pre-requisites: MARS(2005 or 2905) and MARS(2006 or 2906), or 12 credit points of Intermediate Geoscience* units, or (GEOS(2115 or 2915) and BIOL(2018 or 2918))

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_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 (eleanor.bruce@usyd.edu.au)

Dr Ana Vila-Concejo (ana.vilaconcejo@sydney.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: MARS(2005 or 2905) and MARS(2006 or 2906), or 12 credit points of Intermediate Geoscience* units, or (GEOS(2115 or 2915) and BIOL(2018 or 2918))

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.

GEOS3103 - Environmental & Sedimentary Geology

S2

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 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 Adriana Dutkiewicz (adriana.dutkiewicz@sydney.edu.au)
Dr Dan Penny (dan.penny@sydney.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.

GEOS3803 - Environmental & Sedimentary Geology (Adv)

S2

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 Adriana Dutkiewicz (a.dutkiewicz@usyd.edu.au)
Dr Dan Penny (dan.penny@sydney.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

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: Dr Christian Heine (christian.heine@sydney.edu.au)

Dr Gabriele Morra (gabriele.morra@sydney.edu.au)

Dr Simon Williams (simon.williams@sydney.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.

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: Dr Christian Heine (christian.heine@sydney.edu.au)
Dr Gabriele Morra (gabriele.morra@sydney.edu.au)
Dr Simon Williams (simon.williams@sydney.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.

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)

This unit of study aims to decipher the multi-faceted nature of river management by examining how rivers function, from both natural science and social science perspectives. The physical condition of rivers is assessed by considering issues such as catchment hydrology, water quality, the structure and role of riparian vegetation and the functioning of aquatic ecosystems. This information is then combined to examine the science underpinning river rehabilitation projects and environmental assessment of river basin development. The ability to rehabilitate rivers and their management for social and economic goals is also controlled by a range of social and political factors. Therefore, water resource policies and institutions, both within Australia and globally, are also examined in terms of their influences on fluvial systems.

Teacher/Coordinator: Prof Philip Hirsch (philip.hirsch@sydney.edu.au)
Dr Tom Hubble (tom.hubble@sydney.edu.au)

Credit points: 6.

Session: Semester 1

Classes: one 2 hour lecture and one 2 hour tutorial per week, fieldwork
Pre-requisites: 24 credit points of Intermediate units of study including 6 credit points of Intermediate Geoscience (GEOG or GEOS) units of study
Prohibitions: GEOS3918
Assessment: One 2 hour exam, one 1500 word essay, one group project
Textbooks:

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

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

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: Prof Philip Hirsch (philip.hirsch@sydney.edu.au)
Dr Tom Hubble (tom.hubble@sydney.edu.au)

Credit points: 6

Session: Semester 1

Classes: one 2 hour lecture and one 2 hour tutorial per week, fieldwork

Pre-requisites: Distinction average in 24 credit points of Intermediate units of study including 6 credit points of Intermediate Geoscience(GEOS or GEOG) units of study

Prohibitions: GEOS3918

Assessment: One 2 hour exam, one group project, one individual field report

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 (maria.byrne@sydney.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 (not offered in 2010)

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 (maria.byrne@sydney.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 unit that will be held on campus at James Cook University with field work at Orpheus Island and other locations in the Great Barrier Reef Marine Park. The unit focuses on approaches to aquaculture in tropical marine environments with a focus on sustainable aquaculture. Some exercises use the aquarium system on campus at James Cook University. Emphasis is given to aquaculture of tropical invertebrates (especially bivalves and clams) and fishes. 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.

Teacher/Coordinator: Prof Maria Byrne (maria.byrne@sydney.edu.au)

Credit points: 6

Session: Semester 2

Classes: Fieldwork, 72 hours block mode.

Pre-requisites: 12 credit points from Intermediate Science units of study which must include at least 6 credit points of Biology.

Assessment: Assignments and report

NTMP3005 Coastal Management

This unit 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 unit that includes lectures on campus and at the Sydney Institute of Marine Science (SIMS) located in Chowder Bay as well as field trips to sites of interest.

Teacher/Coordinator: Dr Ana Vila-Concejo (ana.vilaconcejo@sydney.edu.au)

Credit points: 6

Session: Semester 2

Classes: one 2 hour lecture and one 2 hour tutorial per week, fieldwork

Pre-requisites: 12 credit points from Intermediate Science units of study

Assessment: Assignment and report

Degree Majors

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.

GEOS3009	Coastal Environments & Processes
GEOS3909	Coastal Environments & Processes (Adv)
GEOS3014	GIS in Coastal Management
GEOS3914	GIS in Coastal Management (Adv)
GEOS3103	Sedimentary & Environmental Geology
GEOS3803	Sedimentary & Environmental Geology (Adv)
GEOS3104	Geophysical Methods
GEOS3804	Geophysical Methods (Adv)
GEOS3018	Rivers: Science, Policy & Management
GEOS3918	Rivers: Science & Management (Adv)

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.

BIOL3006	Ecological Methods
BIOL3906	Ecological Methods (Adv)
BIOL3007	Ecology
BIOL3907	Ecology (Adv)
BIOL3008	Marine Field Ecology
BIOL3908	Marine Field Ecology (Adv)
BIOL3011	Ecophysiology
BIOL3911	Ecophysiology (Adv)
BIOL3013	Marine Biology
BIOL3913	Marine Biology (Adv)

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.
