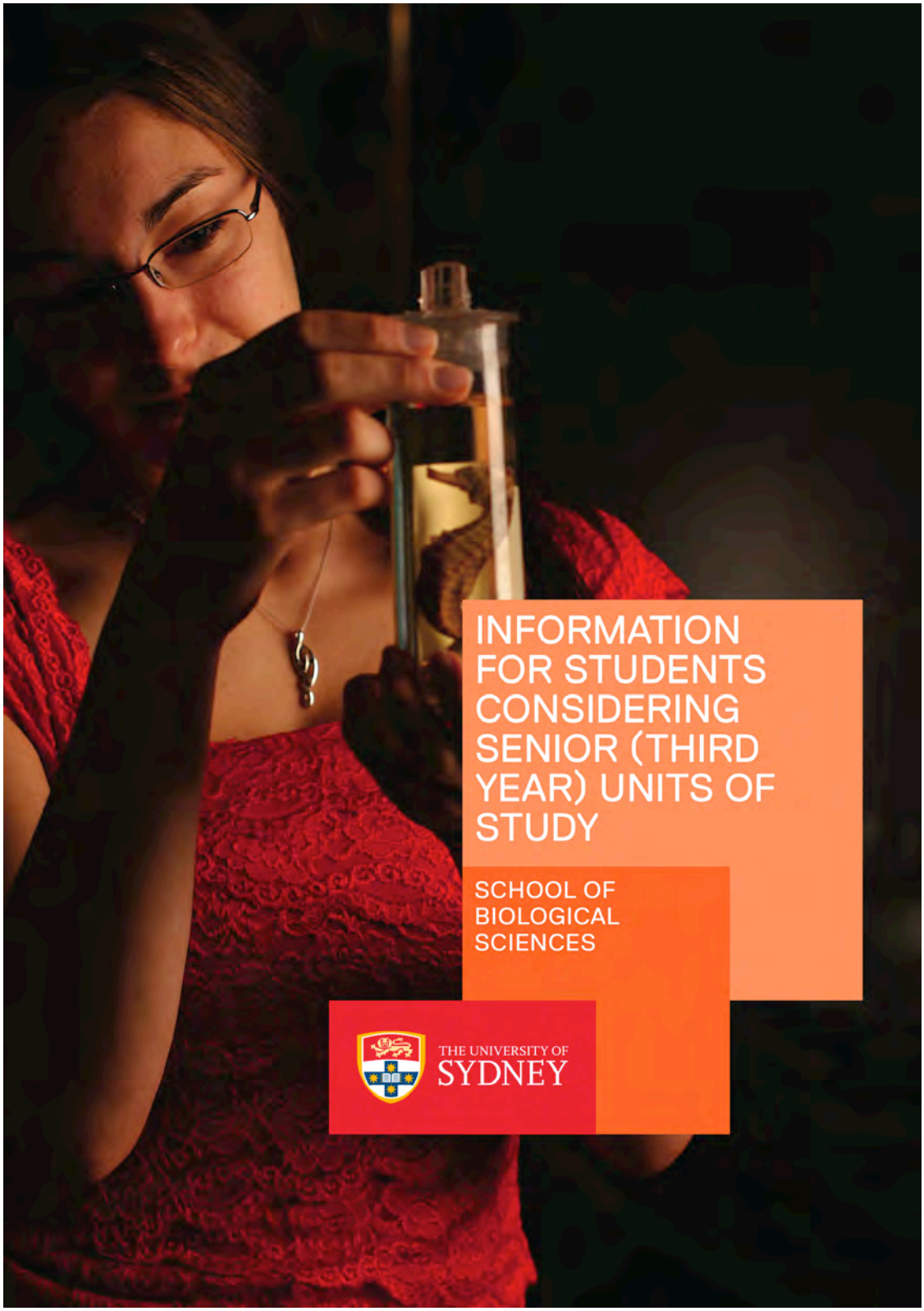

SENIOR BIOLOGY 2012

CONTENTS

For further information, consult the School of Biological Sciences
Web site: http://sydney.edu.au/science/biology

Note that the units of study described here are relevant to current Intermediate and Senior students only and will not be available in 2014. The 2014 Senior curriculum will be posted towards the end of Semester 1, 2013. Prospective students needing further information may contact Dr Elizabeth May: elizabeth.may@sydney.edu.au.

HOW TO SELECT YOUR SENIOR BIOLOGY UNITS OF STUDY

The School of Biological Sciences offers sixteen 6 credit point units of study at the Senior level in Biology. You may take up to eight of these units of study (subject to entry requirements). If you wish to major in Biology you must take at least four Senior Biology units of study.

Units of study

The following units of study have been designed to develop practical skills as well as provide a theoretical understanding of the subject. They are designed to round out the biological training of students in preparation for either further training (*e.g.* Honours or Graduate Diploma studies) or employment. Each unit is 6 credit points. Some units are intensive study units and take place before the beginning of semester 1 or 2.

BIOL3006/3906	Ecological Methods
BIOL3007/3907	Ecology
BIOL3008/3908	Marine Field Ecology
BIOL3009/3909	Terrestrial Field Ecology
BIOL3010/3910	Tropical Wildlife Biology and Management
BIOL3011/3911	Ecophysiology
BIOL3012/3912	Animal Physiology
BIOL3013/3913	Marine Biology
BIOL3016/3616	Coral Reef Biology
BIOL3017/3917	Fungi in the Environment
BIOL3018/3918	Gene Technology and Genomics
BIOL3025/3925	Evolutionary Genetics and Animal Behaviour
BIOL3026/3926	Developmental Genetics
PLNT3001/3901	Plant, Cell and Environment
PLNT3002/3902	Plant Growth and Development
PLNT3003/3903	Systematics and Evolution of Plants

Advanced units of study

Each of the units of study has an Advanced version, offering more independent means of achieving the unit of study objectives. Entry is restricted and normally requires a Distinction grade in the prerequisite Biology units. Advanced units of study are most suitable for students considering Honours or postgraduate research in Biology. Advanced units are denoted by a 9 as the second digit in the unit of study code, *e.g.* BIOL3906 Ecological Methods (Advanced).

Degree requirements

To complete a Bachelor's degree you will need to complete at least 144 credit points. The Bachelor of Science degree requires:

12 credit points in Mathematics and Statistics;

at least 24 credit points of Junior Science units in at least two Science subject areas;

at least 84 credit points of Intermediate (second year) and Senior (third year) units of study;

a major comprising at least 24 credit points of Senior (third year) units of study in one Science subject area.

Students may take combinations of units of study, depending upon the qualifications and interests of the student. Units of study and places in units of study may be subject to student numbers, availability of staff and resources. Quotas exist for BIOL 3008/3908 Marine Field Ecology and BIOL 3009/3909 Terrestrial Field Ecology. When necessary, selection is based on academic merit.

Selecting Senior units of study

In general, it is necessary to have passed 12 credit points of Intermediate Biology to be eligible for Senior Biology. As you select your Senior units of study, check that:

(a) you have passed the pre-requisites stated for each of the units chosen;

(b) the timetables for the Senior Biology units of study that you have selected do not clash;

(c) your unit of study choices satisfy the minimum requirements for your desired major.

Under special circumstances it is possible to take a unit of study without having completed a prerequisite. This would usually involve enrolling concurrently in the prerequisite unit, and permission of the relevant unit coordinator is required.

Planning for your major

Biology Major

For a major in Biology, the minimum requirement is 24 credit points from Senior Biology units of study listed in this subject area (refer page 3 for prerequisites of each third year unit of study). Senior PLNT units and BIOL 3009/3909 and BIOL 3017/3917 may be counted towards a major in either Biology or Plant Science, with the proviso that any unit may be counted only once.
(To proceed to a major in Biology also normally requires 12 credit points of Junior Biology (BIOL/MBLG/EDUH), 12 credit points Junior Chemistry, and at least 12 credit points Intermediate Biology.)

Marine Biology major

For a major in Marine Biology, the minimum requirement is 24 credit points of Senior BIOL units listed under Table 1 for marine science in the Faculty of Science Handbook (marked MS on page 3 of this booklet).

Marine Science major

For a major in Marine Science, the minimum requirement is 24 credit points from Senior Marine Science (BIOL or GEOS) units of study, including at least 6 credit points of Senior BIOL (marked MS on page 3 of this booklet) and 6 credit points of Senior GEOS units.
(It is recommended to prepare for either a Marine Biology or Marine Science major that a student complete 12 credit points of Junior Biology, 12 credit points of Junior Chemistry and 12 credit points of Junior Geosciences.)

Plant Science major

For a major in Plant Science, the minimum requirement is 24 credit points from Senior units of study listed in the following subject areas, which *must* include a minimum of 12 credit points of Senior PLNT units.

PLNT3001/3901	Plant, Cell and Environment	PPAT3003	Plant Disease
PLNT3002/3902	Plant Growth and Development	HORT3005	Production Horticulture
PLNT3003/3903	Systematics and Evolution of Plants	AGRO3004	Managing Agro-Ecosystems
BIOL3009/3909	Terrestrial Field Ecology		
BIOL3017/3917	Fungi in the Environment		

Think about requirements for going on to Honours

Students wishing to enrol in Biology Honours must have satisfied all the requirements for a pass degree and be considered by the Honours Executive Committee and Head of School to have the required aptitude and knowledge for Honours. A prospective Honours student will have:

- a major in one of the Life Sciences (not necessarily Biology)
- an average grade of at least Credit in 12 or more credit points of Senior Life Sciences subjects
- an AAM (annual average mark) of 65 for all Intermediate and Senior units of study attempted[1]

For further information, visit http://sydney.edu.au/science/biology and go to Studying Biology/Honours.

Unit of study manuals and Blackboard

Students will need to purchase the relevant manual for each unit of study from the University Copy Centre (Noel Martin Building). All students in Biology also require a Skills Manual, which can be downloaded from the School Generic Skills site: http://sydney.edu.au/science/biology/learning/generic_skills

All Senior Biology units of study are supported by a Blackboard elearning site. Students will have access to the relevant sites once they have successfully enrolled in a unit of study.

Further advice

You are strongly advised to read the information outlines for each of the units of study in the following pages and if you need further advice you are welcome to discuss your selection of units of study with the relevant unit coordinator , in the first instance, or with Dr Elizabeth May*, to confirm that the combination of units of study is appropriate and possible, and to ensure you have all of the necessary prerequisites.

* Dr May is coordinator of second and third year studies. ☎ 9351 4482 elizabeth.may@sydney.edu.au

[1] **Annual average mark (AAM)** ***(from Faculty of Science Handbook)***
The average mark over all units of study attempted in a given academic year (equivalent to the calendar year). The formula for this calculation is: Σ (marks x credit point value) / Σ (credit point value) (Sums over all units of study completed in the selected period.) The mark is the actual mark obtained by the student for the unit of study, or in the case of a failing grade with no mark – 0. Pass/fail assessed subjects and credit transfer subjects (from another institution) are excluded from these calculations. However, the marks from all attempts at a unit of study are included.

SENIOR (3RD YEAR) UNITS OF STUDY IN BIOLOGY - 2012

For students intending to major in Biology, completion of 6 cp of MBLG units (including MBLG1001) is highly recommended

* Advanced versions of all units of study are available. Entry requirements are similar to those for the standard unit, but performance in prerequisite units of study must be at Distinction level.

SEM = Semester ‡‡, §§ *etc*. are codes referring to pre-semester units – see over for timetable information

UNIT OF STUDY	SEM	PREREQUISITES
BIOL3010 (and Advanced)* TROPICAL WILDLIFE BIOLOGY & MANAGEMENT	‡	12 credit points of Intermediate Biology (BIOL/ENVI/PLNT).
BIOL3017 (and Advanced)* FUNGI IN THE ENVIRONMENT	‡‡	12 credit points of Intermediate Biology or Plant Science; or 6 credit points of Intermediate Biology or Plant Science and 6 Intermediate credit points of either Microbiology or Geography.
BIOL3006 (and Advanced)* ECOLOGICAL METHODS (MS)	1	12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915)
BIOL3011 (and Advanced)* ECOPHYSIOLOGY (MS)	1	12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
BIOL3012 (and Advanced)* ANIMAL PHYSIOLOGY	1	12 credit points of Intermediate Biology.
BIOL3013 (and Advanced)* MARINE BIOLOGY (MS)	1	12 credit points of Intermediate Biology, or 6 credit points of Intermediate BIOL and one of ENVI (2111or 2911) or GEOS (2115 or 2915).
BIOL3018 (and Advanced)* GENE TECHNOLOGY & GENOMICS	1	12 credit points from MBLG (2071/2971), MBLG (2072/2972), and Intermediate Biology units. For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802.
PLNT3003 (and Advanced)* SYSTEMATICS & EVOLUTION OF PLANTS	1	6 credit points from any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL.
BIOL3008 (and Advanced)* MARINE FIELD ECOLOGY (MS)	§	12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
BIOL3009 (and Advanced)* TERRESTRIAL FIELD ECOLOGY	§§	12 credit points of Intermediate Biology (BIOL/MBLG/PLNT/ENVI), or ANSC2004 and BIOM2001.
BIOL3016 (and Advanced)* CORAL REEF BIOLOGY (MS)	§§§	12 credit points from Intermediate science units of study, which must include at least 6 credit points of BIOL units; or 6 credit points of BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
BIOL3007 (and Advanced)* ECOLOGY (MS)	2	12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL, and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
BIOL3025 (and Advanced)* EVOLUTIONARY GENETICS & ANIMAL BEHAVIOUR	2	12 credit points from MBLG (2071/2971), MBLG (2072/2972), and Intermediate Biology (or PLNT) units. For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802. (It is not a requirement (but encouraged) for students to have completed any MBLG unit prior to enrolling in BIOL3025/3925.)
BIOL3026 (and Advanced)* DEVELOPMENTAL GENETICS	2	12 credit points from MBLG (2071/2971) and MBLG (2072/2972). For BMedSc students: 36 credit points of Intermediate BMED units including BMED2802.
PLNT3001 (and Advanced)* PLANT, CELL & ENVIRONMENT	2	12 credit points of Intermediate Biology, Plant Science, Molecular Biology & Genetics or equivalent.
PLNT3002 (and Advanced)* PLANT GROWTH & DEVELOPMENT	2	12 credit points of Intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT (2001 or 2901 or 2003 or 2903), BIOL (2016 or 2916), CROP 2001, AGCH 2002.

SENIOR BIOLOGY LECTURE & LABORATORY TIMETABLES – FULL SEMESTER UNITS OF STUDY

N.B. These times are accurate at the time of printing. It is recommended that students confirm timetable details before the start of each semester on MyUni. Practical class and tutorial times are alternatives in each week. Students will be assigned to specific classes by central timetabling. Please check your personal timetable for your allocated class times.

UNIT OF STUDY	S	LECTURES					PRACTICALS PLEASE NOTE: Details to be confirmed				
		Mon	Tues	Wed	Thur	Fri	Mon	Tues	Wed	Thur	Fri
BIOL3006/3906 (MS)	1	11-12	11-12						2-6		
BIOL3011/3911 (MS)	1	10-11	10-11								2-6
BIOL3012/3912	1				10-11	10-11				2-6	
BIOL3013/3913 (MS)	1				11-12	11-12		2-6			
BIOL3018/3918[A]	1	12-1	12-1				2-6	(2-6) [A]			
BIOL3027/3927 [A]	1				12-1	12-1	(2-5) [A]	2-5			
PLNT3003/3903	1	9-10		12-1			2-5				
BIOL3007/3907 (MS)	2	11-12	11-12						2-5		
BIOL3025/3925	2	12-1	12-1				2-6				
BIOL3026/3926	2				12-1	12-1		2-5			
PLNT3001/3901*	2					11-1	2-6*				
PLNT3002/3902*	2				10-11 and 12-1		2-6*				

* PLNT3001/3901 & PLNT3002/3902: Practical classes alternate weeks.

A BIOL3018/3918 & BIOL3027/3927: (…) indicates an alternate time for a practical session that will be scheduled if enrolments for these units are high. Students attend only one practical session/week.

TIMETABLE & DATES - PRE-SEMESTER UNITS OF STUDY - 2012

Code	Unit of study	Dates	Component
‡	BIOL3010/3910	**Feb 19 - 24** **Feb 27 - Mar 2**	Intensive 5 day field-based course in Northern Territory, followed by: Tutorials and practical classes at University of Sydney.
‡‡	BIOL3017/3917	**Feb 20 - Mar 2**	Each morning (9 - 1) at University of Sydney (plus the equivalent of 30 hours self-guided study during semester 1)
§	BIOL3008/3908	**Jun 30 – Jul 8**	Intensive 8 day field-based course
§§	BIOL3009/3909	**Jul 22 - 27** **Wk 1 – 4, S2**	Intensive 6 day field-based course, followed by: 4 practical classes during weeks 1 - 4 in Semester 2
§§§	BIOL3016/3916	**Jul 9 - 16**	Intensive field-based course on One Tree Island, Great Barrier Reef.

BIOL3006 ECOLOGICAL METHODS **Semester 1**

Prerequisites: 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915)
Prohibition: May not be counted with BIOL3906, MARS3102.

BIOL3906 ECOLOGICAL METHODS (ADVANCED) **Semester 1**

Prerequisites: Distinction average in 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and ENVI2111 or MARS2006; or 12 credit points of Intermediate MARS units, including MARS2006.
Prohibition: May not be counted with BIOL3006, MARS3102
Description: The Advanced 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 a part of the BSc (Advanced) program.
Timetable, Syllabus & Reading Material: As for BIOL3006.

Lecturers: A/Professor C McArthur A/Professor D Hochuli A/Professor R Coleman

Objective: Develop quantitative, experimental skills in the science of ecology and apply them in solving practical biological problems.

When you have successfully completed this unit of study, you should be able to:

- use logical thinking to solve problems
- demonstrate an understanding of the theory and practice of sound experimental design in ecology
- comprehend relationships between observations, their explanations and the nature of experimental tests of hypotheses derived from explanatory theories
- test ecological hypotheses using appropriate statistical methods
- demonstrate competence in the critical appraisal of current scientific ecological literature

Description: 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.

Lectures will be on sound philosophical and experimental principles, drawing on real examples for demonstration of concepts, and will be useful as one basis for informed conservation, utilization and general management of natural populations and habitats.

Practical classes will deal with practical methods of ecological research: determining patterns of distribution and abundance, problems of sampling, estimation of ecological variables, and methods of statistical analysis of field data. As part of these classes you will design and carry out your own ecological research projects, followed by analysis (using statistical software), interpretation and presentation of your data.

Assessment: 1 x 2-hr exam (40%), practical assignments (including calculations, reports and reviews) (60%)

Textbook and Laboratory Manual for BIOL3006/3906
Dytham, C. (2003) *Choosing and using statistics. A biologist's guide*, 2*nd edition*. Blackwell Science, Melbourne.

Recommended Reading
Quinn, G.P., Keough M.J. (2002) *Experimental Design and Data Analysis for Biologists*, 1st edition. Cambridge University Press, Cambridge.
Field, A. (2005) *Discovering statistics using SPSS*, 2nd edition. SAGE Publications, London.
Underwood, A.J. (1997) *Experiments in Ecology: their logical design and interpretation using analysis of variance*. Cambridge University Press, Cambridge.

Laboratory notes will be available to students in advance of the practical sessions.

UNIT COORDINATOR: A/Professor Clare McArthur
☎ 9351 2062 : clare.mcarthur@sydney.edu.au **Rm**: 303 Heydon-Laurence Building (A08)

BIOL3007 ECOLOGY

Semester 2

Prerequisites: 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS(2115 or 2915).
Assumed Knowledge: Although not prerequisites, knowledge obtained from Ecological Methods (BIOL3006), and Marine Field Ecology (BIOL3008) and/or Terrestrial Field Ecology (BIOL3009), or the associated advanced units BIOL (3906, 3908 and/or 3909), is strongly recommended.
Prohibition: May not be counted with BIOL3907 or MARS3102.

BIOL3907 ECOLOGY (ADVANCED)

Semester 2

Prerequisites: Distinction average in 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: Same as BIOL3007; however, students entering this unit of study should have achieved Distinction average.
Prohibition: May not be counted with BIOL3007, or MARS3102.
Description: This unit of study 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 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.
Timetable, Syllabus & Reading Material: As for BIOL3007.

Lecturers: A/Professor D Hochuli , A/Professor C McArthur. A/Professor R Coleman, A/Professor G Wardle

Objective: This unit will develop understanding of key concepts and controversies in ecology and demonstrate how quantitative and experimental skills are used to solve applied ecological problems.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the key concepts and controversies in ecology
- appreciate the experimental basis to developing ecological concepts
- interpret and critically evaluate relevant research articles
- carry out ecological research
- demonstrate an understanding of the role of applied ecology

Description: 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 design, 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.

Lectures: Ecology will be taught as a science based on sound philosophical and experimental principles that are useful for the understanding, informed management, conservation and utilization of natural populations and habitats.

Practical classes will allow individuals and small groups of students to carry out short-term, supervised ecological research projects that are largely of the students' own choosing. The project work is intended to complement and consolidate the understanding of ecology that students acquire in other areas of this unit of study, with the results presented orally and in the form of scientific papers.

Assessment: 1 x 2-hr exam (40%), group presentations (15%), 1 essay (20%), 1 project report (25%)

Textbook: Begon M, Townsend CR, Harper JL (2005) *Ecology: from individuals to ecosystems. 4th edition*. Wiley-Blackwell, Malden, Massachusetts

UNIT COORDINATOR: A/Professor Dieter Hochuli
☎ 9351 3992 : dieter.hochuli@sydney.edu.au **Rm**: 401 Heydon-Laurence Building (A08)

NOTE: this intensive unit of study commences prior to the start of Semester 2 (refer to Timetable on page 4)

BIOL3008 MARINE FIELD ECOLOGY

Semester 2 Intensive*

***Timetable**: Intensive 8 day field course Pre-Semester 2 (30 June – 8 July 2012).
Prerequisites: 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: Ecological Methods BIOL3006 or Ecological Methods (Advanced) BIOL3906. Prior completion of one of these units is very strongly recommended.
Prohibition: May not be counted with BIOL3908 or MARS3102.

BIOL3908 MARINE FIELD ECOLOGY (ADVANCED)

Semester 2 Intensive*

***Timetable**: Same as BIOL3008, plus 4 tutorials.
Prerequisites: Distinction average in 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: Ecological Methods (BIOL3006) or Ecological Methods (Advanced) (BIOL3906). Prior completion of one of these units is very strongly recommended.
Prohibition: May not be counted with BIOL3008 or MARS3102.
Description: The Advanced unit has the same objectives as BIOL3008 Marine Field Ecology 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 the applicants on the basis of their 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) program.
Assessment, Syllabus and Textbooks: As for BIOL3008

Lecturers: A/Professor R Coleman Dr W Figuiera Dr A Ward

Objective: This unit of study is to develop quantitative and experimental skills in the science of marine ecology and aspects of their application to solutions of practical problems.

When you have successfully completed this unit of study, you should be able to:

- use processes of sustained logical thought in relation to problem-solving
- demonstrate an understanding of the theory and practice of simple sampling to estimate patterns of abundance of organisms
- comprehend relationships between observations, their explanations and the nature of experimental tests of hypotheses derived from explanatory theories
- demonstrate an understanding of issues in modern ecology such as the study of patterns of distribution and abundance of organisms and the interactions between them
- demonstrate competence in the critical appraisal of current scientific literature in areas of ecology

LIMITS TO ENROLMENT: 23. When necessary, selection is based on academic merit.

Description: Marine Field Ecology 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.

Assessment: Discussion groups (10%); research project proposal (10%); research project report (50%); biodiversity survey report (20%); data analysis and checking (10%).

Laboratory manual: Notes and schedules will be available via the School's web pages.

Textbooks: No textbook is prescribed but Underwood, A.J., Chapman, M.G. (Eds) (1995) *Coastal Marine Ecology in Temperate Australia.* University of New South Wales Press, Sydney, provides useful background reading.

UNIT COORDINATOR: A/Professor Ross Coleman ☎ 9351 2039 ross.coleman@sydney.edu.au
Centre for Research on Ecological Impacts of Coastal Cities, Edgeworth David Building (A11)

NOTE: this intensive unit of study commences prior to the start of Semester 2 (refer to Timetable on page 4)

BIOL3009 TERRESTRIAL FIELD ECOLOGY

Semester 2 Intensive*

***Timetable**: 6 day field-based course, Dungog (Wangat Lodge), Sunday 22 July to Friday 27 July, 2012, and 4 practical classes during weeks 1 - 4 in semester 2.

Assumed Knowledge: Ecological Methods (BIOL3006) or Ecological Methods Advanced (BIOL3906). Prior completion of one of these units is strongly recommended.

Prerequisites: 12 credit points of Intermediate Biology (BIOL/MBLG/ENVI/PLNT); or ANSC2004 and BIOM2001.

Prohibition: BIOL3909.

PLEASE NOTE: ***a meeting to give an overview of the field trip will be held towards the end of Semester 1.***

BIOL3909 TERRESTRIAL FIELD ECOLOGY (ADVANCED)

Semester 2 Intensive*

Timetable and Assumed Knowledge: Same as BIOL3009.

Prerequisites: Distinction average in 12 credit points of Intermediate Biology.

Prohibition: BIOL3009.

Description: The Advanced unit has the same objectives as BIOL3009, Terrestrial Field Ecology, and is suitable for students who wish to pursue certain aspects of terrestrial field biology 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. This unit of study may be taken as a part of the BSc (Advanced) program.

Textbooks & Reading Material: As for BIOL3009.

Lecturers: A/Professor G Wardle A/Professor C McArthur

Objective: Develop quantitative and experimental skills in the science of ecology, with emphasis on field-based research.

When you have successfully completed this unit of study, you should be able to:

- demonstrate competence in a broad range of ecological sampling techniques used in field-based research
- demonstrate an understanding of the logical and logistical requirements for manipulative field-based ecological research
- demonstrate an understanding of the role of manipulative experimentation in addressing key fundamental and applied ecological problems
- demonstrate skill in converting an ecological question into an experiment, undertaking the practical component to answer the question, and presenting the results and conclusions in an appropriate format.

***LIMITS TO ENROLMENT*:** 48. When necessary, selection is based on academic merit.

Description: This field course provides practical experience in the experimental analysis of terrestrial populations and assemblages. Students learn a broad range of ecological sampling techniques and develop a detailed understanding of the logical requirements necessary for manipulative ecological field experiments. The field work incorporates survey techniques for plants, small mammals and invertebrates and thus provides a good background for ecological consulting work. Students attend a week-long field course and participate in a large-scale research project as well as conducting their own research project. Invited experts contribute to the lectures and discussions on issues relating to the ecology, conservation and management of Australia's terrestrial flora and fauna.

Assessment: Discussions and quiz: (10%); research project proposal and brief presentation (10%); sampling project report (20%); specimen collection (10%); research project report (50%)

Laboratory Manual and Recommended Reading for BIOL3009/3909:

Manuals will be available for students on the field course.

Begon, M., Harper, J.L., Townsend, C.R. (1996) *Ecology: individuals, populations and communities. 3rd edition*. Blackwell Scientific Publications, Boston.

Attiwill, P.,Wilson, B. (2003) *Ecology*: *An Australian Perspective*. Oxford University Press, South Melbourne.

Other readings will be provided in the unit of study manual.

UNIT COORDINATOR: A/Professor Glenda Wardle

☎ 9351 7113 glenda.wardle@sydney.edu.au **Rm**: 319, Heydon-Laurence Building (A08)

NOTE: this intensive unit of study commences prior to the start of Semester 1 (refer to Timetable on page 4)

BIOL3010 TROPICAL WILDLIFE BIOLOGY & MANAGEMENT

Semester 1 Intensive*

***Timetable**: field-based course in the Northern Territory, from 19 - 24 February 2012, followed by tutorials and practical classes at the University of Sydney from 27th February – 2nd March, 2012.

Prerequisites: 12 credit points of Intermediate Biology (BIOL/ENVI/PLNT).

Assumed Knowledge: None, although BIOL2012/2912 Vertebrates and their Origins would be useful.

Prohibition: May not be counted with BIOL3910.

BIOL3910 TROPICAL WILDLIFE BIOLOGY & MANAGEMENT (ADV)

Timetable: Same as BIOL3010. **Semester 1 Intensive**

Prerequisites: Distinction average in 12 credit points of Intermediate Biology.

Prohibition: May not be counted with BIOL3010.

Description: This unit of study has the same objectives as BIOL3010 Tropical Wildlife Biology & Management, and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the field trip. This unit of study may be taken as a part of the BSc (Advanced) program.

***Lecturers**:* Dr Jonathan Webb and Dr Mathew Crowther from the School of Biological Sciences, as well as guest lecturers (University of Wollongong, and researchers working in the Top End).

Objective: This unit provides a broad overview of the evolutionary radiation of terrestrial vertebrates, with particular emphasis on the management and conservation of Australia's unique fauna. Students will learn a range of field techniques needed to survey, identify and track wildlife, and will gain an understanding of the complex issues involved with the conservation, management and sustainable use of native wildlife and their ecosystems.

When you have successfully completed this unit of study, you should be able to:

- describe the diversity of fauna and habitats in northern Australia
- demonstrate an understanding of important concepts of conservation biology through the study of the Australian fauna
- discuss current issues in wildlife management including invasive pest species and fire management
- demonstrate an understanding of indigenous land management issues
- capture, identify and track native and introduced wildlife, and estimate their abundance
- carry out scientific research (including data collection, data analysis, and verbal and written communication of research findings).

***Description**:*

Due to its isolation from the rest of the world and unique evolutionary history, the Australian terrestrial vertebrate fauna (amphibians, reptiles, birds and mammals) is highly unusual, and hence has a lot to offer in the study of evolutionary processes. The rarity of some species and Australia's unusual climate and landforms present special challenges for the management of our native wildlife. This unit of study addresses the evolution, ecology and management of Australia's terrestrial fauna. The subject comprises a week-long field-based course in the Northern Territory, near Darwin, where students will travel to Mary River Park to learn field-based techniques in wildlife management. There will also be a day trip to Litchfield National Park to allow students to see the diversity of landforms and wildlife of the region. The field trip will be complemented by lectures from experts in the evolution, ecology and management of wildlife.

Venue and Cost of the Field Trip and Timetable

Refer to web-site for full details. http://www.bio.usyd.edu.au/studying_biology/undergraduate/biol3010.shtml

Assessment: 1 x 2-hr theory examination (40%), 1 x 1-hr practical exam (10%), seminar (10%), a short report (10%) and an essay (20%). The practical exam will be held at Mary River Park, and the theory exam will be held at the University of Sydney on Friday afternoon.

Recommended References:

Field guides for identifying reptiles, amphibians, and birds will be available during the field trip.

Caughley, G., Gunn, A. (1996) *Conservation Biology in Theory and Practice.* Blackwell Science, Cambridge, USA.

Sodhi, N.S., Brook, B.W., Bradshaw, C.J.A. (2007) *Tropical Conservation Biology.* Blackwell, Oxford,

Shine, R. (1998) *Australian Snakes. A Natural History*. Reed New Holland, Sydney.

UNIT COORDINATOR: Dr Jonathan Webb

☎ 9351 5571 jonathan.webb@sydney.edu.au **Rm**: 445 Heydon-Laurence Building (A08)

BIOL3011 - ECOPHYSIOLOGY **Semester 1**

Prerequisites: 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
NB: The completion of 6 credit points of MBLG units is highly recommended.
Prohibition: May not be counted with BIOL3911.

BIOL3911 - ECOPHYSIOLOGY (ADVANCED) **Semester 1**

Prerequisites: Distinction average in 12 credit points of Intermediate Biology; or 6 credit points of Intermediate BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915). These requirements may be varied and students with lower averages should consult the unit coordinator .
Assumed Knowledge: BIOL (2012 or 2016 or 2912 or 2916) or PLNT (2003 or 2903).
NB: *The completion of 6 credit points of MBLG units is highly recommended.*
Prohibition: May not be counted with BIOL3011.
Description*:* Ecophysiology (Advanced) shares the same lectures as BIOL3011 Ecophysiology but 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.

Lecturers: A/Professor F Seebacher Professor S Simpson

Objective*:* This unit of study develops an understanding of the physiological mechanisms that underlie animal responses to changing environments.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of how different and/or changing environments influence the physiology of organisms
- demonstrate an understanding of the major physiological responses of organisms to different environments
- demonstrate an understanding of adaptation and phenotypic plasticity
- demonstrate familiarity with methods of measuring environmental variables that influence the physiology of organisms
- design and conduct field and laboratory experiments
- analyse physiological data and write a scientific paper

Description*:*
Ecophysiology links physiological mechanisms with the behaviour, ecology and evolution of animals. Many ecological, evolutionary, and behavioural patterns are determined by the capability of animals to respond to changes in their environment. Ecophysiology is a conceptually-based unit of study that explores the importance of environmental parameters such as temperature for biological functions. At a functional level, examples presented in this unit will range from gene expression to behaviour and emphasis will be placed on animals. The practical part of the unit concentrates on designing original research projects, which will be conducted during a 3-day field trip, and in the laboratory.

Assessment: 1 x 1.5-hr exam, field trip, seminar, laboratory report.

Recommended Reference:
Withers, P.C. (1992) *Comparative Animal Physiology*, Saunders College Publishing, Fort Worth.

UNIT COORDINATOR: A/Professor Frank Seebacher
☎ 9351 2779 frank.seebach@sydney.edu.au **Rm**: 413, Heydon-Laurence Building (A08)

BIOL3012 - ANIMAL PHYSIOLOGY

Semester 1

Prerequisites: 12 credit points of Intermediate Biology.
NB: *The completion of 6 credit points of MBLG units is highly recommended*.
Prohibition: May not be counted with BIOL3912.

BIOL3912 - ANIMAL PHYSIOLOGY (ADVANCED)

Semester 1

Prerequisites: Distinction average in 12 credit points of Intermediate Biology.
NB: *The completion of 6 credit points of MBLG units is highly recommended*.
Prohibition: May not be counted with BIOL3012.
Description*:* This unit of study has the same objectives as BIOL3012 Animal Physiology and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.

Lecturer*:* Dr M Thomson Professor M Thompson Professor S Simpson

Objective*:* The purpose of this unit of study is to develop an in-depth understanding of some major aspects of the physiology of animals.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the relationships between physiological principles such as nutrition, energy metabolism, digestion, locomotion and environmental parameters that influence those aspects of animal physiology
- carry out experiments on animal metabolism
- demonstrate familiarity with the fundamentals of a scanning electron microscope

Description*:*
Animal physiology explores aspects of the physiology of animals and how physiology is influenced by environmental factors. The emphasis of the unit of study is vertebrate animals, although invertebrate examples are used where appropriate. The unit of study is designed to complement BIOL3011 Ecophysiology. Particular emphasis will be placed on nutrition, animal behaviour, energy metabolism and neurobiology as well as more exotic animal physiology such as electroreception in sharks and infra-red detection of prey in snakes. Particular emphasis will be placed on nutrition and energy metabolism in a range of animals and how that is affected by factors such as predator-prey relationships as well as behaviour and locomotion.

Assessment: 1 x 3-hr examination (50%), mid-semester quiz (10%), laboratory work (10%), laboratory reports (40%), seminar (10%).

Recommended References:
This unit does not utilize a single textbook; instead it draws from several texts as well as scientific journal papers. Students will find the following texts very useful; they are available from the library. If students wish to purchase a text, any one from the list below would be helpful. It would not be necessary to purchase more than one text.

Moyes, D., Schulte, P.M. (2008) *Principles of Animal Physiology*. Benjamin Cummings, San Francisco
Randall, D., Burggren, E., French, K. (1988) *Eckert Animal Physiology. 5th edition*, Freeman, NY
Schmidt-Nielsen, K. (1990) *Animal Physiology: Adaptation and Environment*. 5th edition, CUP
Withers, P.C. (1992) *Comparative Animal Physiology*, Saunders College Publishing, Fort Worth

A laboratory manual will be available on the web prior to the beginning of lectures.
Further information is available at: http://www.bio.usyd.edu.au/studying_biology/undergraduate/biol3012.shtml

UNIT COORDINATOR: Dr M Thomson
☎ 9036 6412 murray.thomson@sydney.edu.au **Rm**: 314, Heydon-Laurence Building (A08)

BIOL3013 - MARINE BIOLOGY **Semester 1**

Prerequisites: 12 credit points of Intermediate Biology, or 6 credit points of Intermediate BIOL and one of ENVI (2111or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: BIOL2018 or MARS2006.
NB: *The completion of 6 credit points of MBLG units is highly recommended*
Prohibition: May not be counted with BIOL 3913.

BIOL3913 - MARINE BIOLOGY (ADVANCED) **Semester 1**

***Prerequisites*:** Distinction average in 12 credit points of Intermediate Biology, or 6 credit points of Intermediate BIOL and one of ENVI (2111or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: BIOL2018 or GEOS2115.
NB: *The completion of 6 credit points of MBLG units is highly recommended*
Prohibition: May not be counted with BIOL3013.
Description: This unit of study has the same objectives as BIOL3013 Marine Biology and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus & Reading Material: As for BIOL3013.

Lecturers*:* Dr W Figueira Dr A Ward

Objective*:* The goal of this subject is to develop a deeper understanding of processes that are important for the establishment and maintenance of marine communities, while teaching critical scientific thinking and writing skills. 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.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the advanced concepts associated with organismal and environmental processes in marine communities
- recognize some of the current problems in marine research
- read primary literature critically
- conduct analysis of experimental data and present results in a scientific manner

Description*:*
This subject assumes a basic knowledge of marine biology and seeks to build upon this by examining in detail processes that are important for the establishment and maintenance of marine communities. During the course of the semester there will be four modules that will examine specific current topics in marine biology. Each module will have a series of lectures, practicals, and/or tutorials that will allow us to examine the process under review in depth. The composition of the modules may change from year to year depending on what is relevant in today's scientific climate. In the past we have examined biomechanics, population ecology, symbiosis, marine mammal ecology, impacts of humans on the sea, animal behaviour and global climate change. There is a strong focus in the course on field-based practicals, which can include activities such as intertidal rock platform visits, snorkel surveys of reef fishes and off-shore marine mammal boat cruises.

Assessment*:* Assessment will be based upon a final exam and assignments, which may include laboratory reports, presentations and paper criticisms. Assessment for the advanced component is a poster on the independent research project in lieu of one of the practical reports.

Recommended References*:*
Bertness, M.D., Gaines S.D., Hay M.E. (eds) (2001) *Marine Community Ecology*. Sinauer, Maryland.
Castro, P., Huber, M. (2000) *Marine Biology. 3rd edition*. McGraw-Hill Higher Education, Sydney.
Pechenik, J.A. (2010) *A Short Guide to Writing About Biology*, *7th edition*. Longman, New York.

UNIT COORDINATOR: Dr William Figueira ☎ 9351 2039 will.figueira@sydney.edu.au
Centre for Research on Ecological Impacts of Coastal Cities, Edgeworth David Building (A11)

NOTE: this intensive unit of study commences before the start of Semester 2 (refer to Timetable on page 4)

BIOL3016 – CORAL REEF BIOLOGY **Pre-Semester 2 Intensive***

***Timetable**: Intensive field-based course held Pre-Semester 2 (9 - 16 July 2012).
Prerequisites: 12 credit points from Intermediate science units of study which must include at least 6 credit points of BIOL units; or 6 credit points of BIOL and one of ENVI (2111 or 2911) or GEOS (2115 or 2915).
***Assumed Knowledge*:** 12 credit points of Intermediate Biology.
Prohibition: May not be counted with NTMP3001, BIOL3916.

BIOL3916 - CORAL REEF BIOLOGY (ADVANCED) **Pre-Semester 2 Intensive***

***Prerequisites*:** Distinction average in 12 credit points of Intermediate Biology, or 6 credit points of Intermediate BIOL and one of ENVI (2111or 2911) or GEOS (2115 or 2915).
Assumed Knowledge: BIOL2018 or GEOS2115.
Prohibition: May not be counted with NTMP3001, BIOL3016.
Description: This unit of study has the same objectives as BIOL3016 Coral Reef Biology and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus & Reading Material: As for BIOL3016.

***Lecturers**:* Professor Maria Byrne

***Objective**:* This unit of study aims to develop an in-depth understanding of the biological and non-biological processes that make up coral reef ecosystems.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the diversity of coral reef animals and plants, their patterns of distribution and the interactions between them
- demonstrate a comprehensive understanding of Darwin's paradox: the presence of the world's greatest marine biodiversity in oligotrophic seas
- gain an appreciation of the processes involved in management issues specific to the Great Barrier Reef Marine Park
- demonstrate an understanding of major issues facing the world's coral reefs in the face of climate change
- demonstrate competence in the critical appraisal of current scientific literature
- demonstrate an understanding of the approaches involved with tropical marine research
- conceive and undertake a research project

LIMITS TO ENROLMENT: 15-20. When necessary, selection is based on academic merit.

Description: Coral Reef Biology is an intensive unit held at a research station on the Great Barrier Reef, usually One Tree Island Research Station. The unit focuses on the dominant taxa in coral reef environments and the linkages between them. Emphasis is placed on the biological adaptations for life in tropical waters and the ecological, oceanographic and physiological processes involved. Aspects covered include: processes influencing the distribution of coral reefs, symbiosis, reef connectivity, lagoon systems, nutrient cycling and the impacts of climate change and other anthropogenic pressures on the world's coral reefs.

***Assessment**:* essays (20%); research project report (30%); exam (50%)

***Textbooks**:* Lecture notes will be provided. No textbook is prescribed.
Key reference text: Hutchings, P. et al (2008) *Great Barrier Reef, Biology Environment and Management*. CSIRO Press, Collingwood.
***Laboratory manual**:* Practical notes will be provided.

UNIT COORDINATOR: Professor Maria Byrne ☎ 9351 5166 maria.byrne@sydney.edu.au
Rm: S627 Anderson Stuart (F13) (and Edgeworth David Building - A11)

NOTE: intensive unit of study commencing 2 weeks prior to the start of Semester 1 (refer to Timetable on page 4)

BIOL3017 - FUNGI IN THE ENVIRONMENT

Pre-Semester 1 Intensive*

***Timetable**: Each morning from Monday 20th February to Friday 2nd March 2012, plus the equivalent of 30 hours self-guided study during the semester.
Prerequisites: 12 credit points of Intermediate Biology or Plant Science; or 6 credit points of Intermediate Biology or Plant Science and 6 Intermediate credit points of either Microbiology or Geography.
NB: *The completion of 6 credit points of MBLG units is highly recommended.*
Prohibition: May not be counted with BIOL3917.

BIOL3917 - FUNGI IN THE ENVIRONMENT (ADVANCED)

Pre-Semester 1 Intensive*

Prerequisites: Distinction average in 12 credit points of Intermediate Biology or Plant Science; or 6 credit points of Intermediate Biology or Plant Science and 6 Intermediate credit points of either Microbiology or Geography.
NB: *The completion of 6 credit points of MBLG units is highly recommended.*
Prohibition: May not be counted with BIOL3017.
Description: This unit of study has the same objectives as BIOL3017 Fungi in the Environment and is designed for students who wish to pursue one topic in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will complete a research project and submit a report prior to the end of Semester 1. Details of the research project will be negotiated between the student and unit coordinator during the first week of the unit. The research report will replace the written reports of BIOL3017. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus, Textbooks & Reading Material: As for BIOL3017

***Lecturers**:* A/Professor P McGee Dr O Lilje

***Objective**:* The aim of this unit of study is to develop an understanding of the function of fungi in the environment.

When you have successfully completed this unit of study, you should be able to:

- analyse and explain a mycological concept working from primary sources
- develop an experimental approach to answering basic mycological issues
- demonstrate a detailed understanding of one area of fungal biology

***Description**:*
The unit is designed for students interested in fungal ecology, environmental and rehabilitation biology, mechanisms underlying fungal diversity, biological control of pests and pathogens, and soil microbiology. Emphasis will be placed on the functions of fungi in soil and the benefit provided by fungi in symbiotic interactions with plants, including mycorrhizal fungi and shoot-borne endophytes, using experimental approaches. Physiological and ecological implications of the interactions will also be considered, emphasising the use of fungi in rehabilitation of ecosystems and biocontrol of pests and pathogens. Students will be encouraged to develop deeper understanding of one area of the subject through independent study.

The intensive 2-week laboratory component allows each student to follow a set of experiments or design and implement their own research. The laboratory component is scheduled in the A11 labs each morning, starting from 20th February and going through to 2nd March 2012.

Independent thinking and research-led activity are encouraged. Part of the learning material will be available on the internet. The material will be freely available for discussion during Semester 1.

Assessment:
Negotiated individually, and may include 1 x 2-hr take-home exam, laboratory component and written assignments.

Recommended References:
http://bugs.bio.usyd.edu.au/learning/resources/Mycology/

UNIT COORDINATOR: A/Professor Peter McGee
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BIOL3018 - GENE TECHNOLOGY & GENOMICS **Semester 1**

Prerequisites: 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units.
For BMedSc students: 36 credit points of Intermediate BMED units including BMED2802.
Prohibition: May not be counted with BIOL3918.

BIOL3918 - GENE TECHNOLOGY & GENOMICS (ADVANCED) **Semester 1**

Prerequisites: Distinction average in 12 credit points from MBLG (2071/2971), MBLG (2072/2972) and Intermediate Biology units.
For BMedSc students: 36 credit points of Intermediate BMED units including Distinction in BMED2802.
These requirements may be varied and students with lower averages should contact the unit coordinator .
Prohibition: May not be counted with BIOL3018.
Description: This unit of study has the same objectives as BIOL3018 Gene Technology & Genomics and is suitable for students who wish to pursue certain aspects of molecular genetics in greater depth. Students taking this unit of study will participate in alternatives to some elements of the standard BIOL 3018 unit of study, and will be required to pursue the unit of study objectives by more independent means. Details of this unit of study and assessment will be announced at the beginning of semester.
Timetable, Textbooks& Other Reading Material: As for BIOL3018 Gene Technology & Genomics
N.B.: This is a core Senior unit of study for the BSc (Molecular Biology and Genetics) program.

Lecturers: Dr B Lyon Dr P Smith

Objectives: To integrate and strengthen understanding of the role of recombinant DNA technology in the modern world and provide insight into the latest discoveries and applications of gene technology.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the recent advances in recombinant DNA technology and consider the commercial, societal and environmental implications of genetic engineering.
- demonstrate and practice a range of molecular genetics skills applicable to the utilisation of gene technology and the genetic engineering of micro-organisms, plants and animals.

Description:
A unit of study with lectures, practicals and tutorials on the application of recombinant DNA technology and the genetic manipulation of prokaryotic and eukaryotic organisms. Lectures cover the applications of molecular genetics in biotechnology and consider the impact and implications of genetic engineering and genomics. Topics include: biological sequence data and databases; comparative genomics; the cloning and expression of foreign genes in bacteria, yeast, animal and plant cells; novel human and animal therapeutics and vaccines; new diagnostic techniques for human and veterinary disease; the transformation of animal and plant cells; the genetic engineering of animals and plants; and the environmental release of genetically-modified (transgenic) organisms. Practical work may include: nucleic acid isolation and manipulation; gene cloning and PCR amplification; DNA sequencing and bioinformatics; immunological detection of proteins; and the genetic transformation and assay of plants.

The emphasis in the practical part of the unit of study is on hands-on experience. Web-based tutorials will be available each week to provide background to the experimental work. A group project will give students the opportunity to investigate a current application of recombinant DNA technology in greater depth.

A laboratory manual with lecture and practical schedules, unit of study assessment information and detailed descriptions and protocols for the laboratory exercises will be available from the University Copy Centre prior to the first practical. Additional unit information including lecture notes will be available on Blackboard.

Assessment: 1 x 2-hr theory examination (60%), practical report (10%), assignment/seminar (30%).

Timetable: 2 x 1-hr lectures/week, 1 x 4-hr practical/week.

UNIT COORDINATOR: Dr Bruce Lyon
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BIOL3025 - EVOLUTIONARY GENETICS & ANIMAL BEHAVIOUR

Semester 2

Prerequisites: 12 credit points from MBLG (2071/2971), MBLG (2072/2972), and Intermediate Biology (or PLNT) units. For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802.
It is not a requirement (but encouraged) for students to have completed any MBLG unit prior to enrolling in BIOL3025/3925.
NB: *The completion of 6 credit points of MBLG units is highly recommended.*
Prohibition: May not be counted with BIOL3925.

BIOL3925 - EVOLUTIONARY GENETICS & ANIMAL BEHAVIOUR (ADVANCED)

Semester 2

Prerequisites: Distinction average in 12 credit points of Intermediate Biology, which may include MBLG (2071/2971), MBLG (2072/2972).
For BMedSc students: 36 credit points of Intermediate BMED units including Distinction in BMED2802.
These requirements may be varied and students with lower averages should consult the unit coordinator .
NB: *The completion of 6 credit points of MBLG units is highly recommended*.
Prohibition: May not be counted with BIOL3025.
Description: This unit of study has the same objectives as BIOL3025 Biology of Evolutionary Genetics & Animal Behaviour and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus, Textbooks & Other Reading Material: As for BIOL3025

Lecturers*:* Professor B Oldroyd A/Professor M Beekman

Objective*:* To provide a strong background in the genetic basis of evolutionary theory and animal behaviour.

When you have successfully completed this unit of study, you should be able to:

- apply molecular and statistical tools to analyse genetic variation in natural populations so that problems in behaviour, microevolution and conservation genetics can be quantitatively addressed
- demonstrate an understanding of the evolutionary basis of animal (and human) behaviour.

Description*:*
The Evolutionary Genetics and Animal Behaviour unit of study covers the main themes of modern evolutionary theory including population genetics. In the practicals, students use molecular methods to quantify genetic variation in natural populations. Using these skills we will search for population subdivision and discuss how this can lead to speciation. Lectures consider how studies of sex ratios, sexual selection, kin selection, game theory and quantitative genetics can illuminate the mechanisms by which animals have evolved and explain why they behave as they do. We will then consider if these themes have any relevance to human sociobiology. The course also covers the role of genetics in conservation. There will be a field trip to collect organisms for population genetic analysis. There will be plenty of opportunity in the student seminars to examine the more controversial aspects of modern evolutionary thought.

Assessment*:* 1 x 1.5-hr theory examination (50%), practical reports and assessments (40%) and seminar presentation (10%).

Recommended References:
Alcock, J. (2001) *Animal Behaviour,* Sinauer Associates.

Textbook*:*
Freeman, S., Herron, J.C. (2007) *Evolutionary analysis. 4th edition.* Prentice Hall, Upper Saddle River, NJ.

Please note that completion of MBLG 2072 is not required for this unit of study but is recommended.

UNIT COORDINATOR: Professor Ben Oldroyd
☎ 9351 7501 benjamin.oldroyd@sydney.edu.au **Rm**: 245 Macleay Building (A12)

BIOL3026 - DEVELOPMENTAL GENETICS **Semester 2**

Prerequisites: 12 credit points from MBLG (2071/2971) and MBLG (2072/2972).
For BMedSc students: 36 credit points of Intermediate BMED units including BMED 2802.
Prohibition: May not be counted with BIOL3926.

BIOL3926 - DEVELOPMENTAL GENETICS (ADVANCED) **Semester 2**

Prerequisites: Distinction average in 12 credit points from MBLG (2071/2971) and MBLG (2072/2972).
For BMedSc students: 36 credit points of Intermediate BMED units including Distinction in BMED2802.
These requirements may vary and students with lower averages should consult the unit coordinator .
Prohibition: May not be counted with BIOL3026.
Description: This unit of study has the same objectives as BIOL3026 Developmental Genetics and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus, Textbooks & Other Reading Material: As for BIOL3026

Lecturers: Dr J Saleeba Dr Mary Byrne

Objective: To integrate and strengthen understanding of the many diverse areas of genetics and genomics that apply to eukaryotic development.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the recent advances in molecular genetics and gene technology and their applications to the exploration of the developmental biology of higher organisms
- demonstrate and practise a range of molecular, cytological and developmental skills applicable to the study of genetics in plants, animals and humans

Description:
This unit discusses the major concepts and current understanding of developmental biology with an emphasis on molecular genetics. The developmental genetics of model plant and animal systems, and approaches used to determine how a complex multicellular organism is established in a single cell, will be investigated. In particular, the molecular genetics development of model animal species, including invertebrates and vertebrates, and plant-specific processes such as leaf, root and flower development, will be covered. The study of mutants in development will be used to highlight pattern formation and the importance of regulated gene expression in development. Reference will be made to the use of modern techniques in developmental biology such as transgenics, recombinant DNA technology and tissue-specific expression analysis. Various methods of genetic mapping will be covered. Practical work complements the theoretical aspects and develops important genetical skills.

Assessment:
1 x 2-hr theory examination (60%), assignment (20%), laboratory note-book (20%).

UNIT COORDINATOR: Dr Mary Byrne
☎ 9114 0978 mary.byrne@sydney.edu.au **Rm**: 114 Macleay Building (A12)

PLNT3001 - PLANT, CELL & ENVIRONMENT **Semester 2**

Prerequisites: 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent.
Prohibition: May not be counted with PLNT3901.

PLNT3901 - PLANT, CELL & ENVIRONMENT (ADVANCED) **Semester 2**

Prerequisites: Distinction in 12 credit points of Intermediate Biology, Plant Science, Molecular Biology and Genetics or equivalent. These requirements may be varied and students with lower averages should consult the unit coordinator .
Prohibition: May not be counted with PLNT3001.
Description: This unit of study has the same objectives as PLNT3001 Plant, Cell & Environment and is suitable for students who wish to pursue certain aspects in greater depth. Entry to the unit is based on performance in Intermediate units of study. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by undertaking an independent research project. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Assessment: Refer to PLNT3001 details below.
Timetable, Syllabus, Textbooks & Other Reading Material: As for PLNT3001.

Lecturers: Dr C Warren Dr B Jones

Objective: The purpose of this unit of study is to develop an understanding of how plants affect ecosystem function and how the environment affects plant function current direction in plant science.

When you have successfully completed this unit of study, you should be able to demonstrate:

- familiarity with modern approaches of physiology, biophysics and molecular biology in the study of plant and ecosystem function
- an understanding of the central role of plants in the function of terrestrial ecosystems
- an understanding of how domains of knowledge interact to describe plant function factors that limit primary productivity of terrestrial ecosystems
- an understanding of the acclimation and adaptation of plants to show how plants function in stressful environments

Description: This unit of study of comprises lectures, workshops and practical sessions that will explore how plants and ecosystems function. Classes will examine the central role of plants in the function of terrestrial ecosystems (*e.g.* global and ecosystem cycles of carbon and nutrients). Plants shape how ecosystems function, and at the same time the environment affects how plants function. Hence, we will also examine the mechanisms plants employ to adapt and acclimate to their (often stressful) environment. Adaptation and acclimation of plants to their environment will be examined at molecular through to whole plant scales. You will need to draw on knowledge from Intermediate units of study and explore the published literature to successfully integrate information from areas unfamiliar to yourself.

***Assessment*:** 1 x 2–hr theory examination (40%);
plus for PLNT 3001: 2 x reports (30% each) individual essay/lab report (20%), group presentation (10%)
PLNT 3901: students will be given the opportunity to undertake more open-ended project work to replace one of the practical reports. 40% of the final mark will be based on a draft manuscript of the project, and a short presentation during the final lecture slot of week 13.

Textbooks & Other Reading Material:
Students will be drawing on the current research literature for content. A Study Guide for the unit will be available for purchase during the first week of semester from the Copy Centre.

UNIT COORDINATOR: Dr Charles Warren (School of Biological Sciences)
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Academic Staff: Dr Brian Jones (Faculty of Agriculture, Food and Natural Resources)
☎**:** 9351 2660 🖱: brian.jones@sydney.edu.au **Rm**: S220, John Woolley Building (A20)

PLNT3002 – PLANT GROWTH & DEVELOPMENT

Semester 2

Prerequisites: 12 credit points of Intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT (2001 or 2901 or 2003 or 2903), BIOL (2016 or 2916), CROP 2001 or AGCH 2002.
Prohibition: May not be counted with PLNT3902.

PLNT3902 – PLANT GROWTH & DEVELOPMENT (ADVANCED)

Semester 2

Prerequisites: Distinction average in 12 credit points of Intermediate PLNT, BIOL, AGCH or CROP units of study including at least one of PLNT (2001 or 2901 or 2003 or 2903), BIOL (2016 or 2916), CROP 2001 or AGCH 2002. These requirements may be varied and students with lower averages should consult the unit coordinator .
Prohibition: May not be counted with PLNT3002.
Description: This unit of study has the same objectives as PLNT 3002 Plant Growth & Development and is suitable for students who wish to pursue certain aspects in greater depth. Entry to the unit is based on performance in Intermediate units of study. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Syllabus, Textbooks & Other Reading Material: As for PLNT3002.

Lecturers: A/Professor J Marc Professor R Overall Dr B Jones Professor D Guest

Objective: To develop an understanding of the cellular and molecular events underlying plant development.

When you have successfully completed this unit of study, you should be able to:

- demonstrate an understanding of the basic cellular and molecular processes in plant development
- demonstrate familiarity with modern methods such as immunochemistry and molecular techniques
- design, execute and analyse cellular and developmental experiments
- carry out experiments involving plant cells, protoplasts and proteins
- write scientific papers and reports to publication quality
- critically analyse published scientific papers in this field
- appreciate how recent advances in cellular and molecular biology have enhanced our understanding of plant development

Description: This unit explores the mechanisms underlying plant growth and development from seed to maturity. It covers the process of building the plant body from embryogenesis, development and operation of meristems, polarity, patterning, controls of flowering and fruit development to programmed cell death and senescence. It includes the role of signals such as plant hormones in coordinating plant growth and development and the molecular and cellular mechanisms underlying plant responses to environmental signals such as gravity and light. There is a focus on recent plant molecular biology that has been critical in enhancing our current understanding of plant growth and development. The unit uses examples from crop, horticultural and native plants as well as the model plant Arabidopsis. Lectures are augmented by experimental work, including an independent research project. The laboratory work will include plant tissue culture, protoplast production and modern cell biological techniques used to study plant development. This unit of study complements other Senior units of study in the Plant Science Major and is essential for those seeking a career in plant molecular biology.

Assessment:
PLNT3002: 1 x 2-hr exam (60%), project presentation and report (20%), laboratory quizzes, report and book (20%).
PLNT3902: 1 x 2-hr exam (60%), project presentation and report (20%), laboratory quizzes and book (20%).

Textbooks:
Taiz, L., Zeiger, E. (2010) *Plant Physiology. 5th edition*. Sinauer Associates Inc. Publishers, Sunderland, Massachusetts.

Recommended References
Atwell, B., Kriedemann, P., Turnbull, C. (1999) *Plants in Action*. Macmillan South Yarra.
Buchanan, B.B., Gruissem, W., Jones, R.L. (2000) *Biochemistry and Molecular Biology of Plants*. ASPP Rockville, Maryland.
A Study Guide will be available for purchase from the Copy Centre during Week 1 of Semester 1.

UNIT COORDINATOR A/Professor Jan Marc
☎ 9351 2383 jan.marc@sydney.edu.au **Rm**: 308 Macleay Building (A12)

PLNT3003 - SYSTEMATICS AND EVOLUTION OF PLANTS **Semester 1**

Prerequisites: 6 credit points from any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL.
Prohibition: May not be counted with PLNT3903.

PLNT3903 - SYSTEMATICS AND EVOLUTION OF PLANTS (ADVANCED)

Semester 1

Prerequisites: Distinction in 6 credit points from any Intermediate unit of study from BIOL, PLNT, LWSC, HORT, GEOS, GEOG, ENVI, SOIL. These requirements may be varied and students with lower averages should consult the unit coordinator .
Prohibition: May not be counted with PLNT3003.
Description: This unit of study has the same objectives as PLNT3003 Systematics and Evolution of Plants and is designed for students who wish to pursue certain topics in greater depth. Entry to the unit is based on performance in Intermediate Biology. Students taking this unit of study will participate in alternatives to some elements of the standard unit and will be required to pursue the objectives by more independent means. Details of this unit of study and assessment will be announced at, or prior to, commencement of the semester. The content and nature of these components may vary from year to year. This unit of study may be taken as a part of the BSc (Advanced) program.
Timetable, Assessment, Textbooks & Other Reading Material: As for PLNT3003.

Lecturers: A/Professor M Henwood A/Professor B Conn Dr M Pye

Objective: The aim of this unit of study is to provide an understanding of the evolution, biogeography, patterns of diversification, and the global significance of the terrestrial flora of Australia.

When you have successfully completed this unit of study, you should be able to discuss:

- the diversity - including identification and classification - of the major components of the Australian biota
- the geographic distribution of each of the major components of the Australian flora and the factors (past and present) that determine their distribution
- the evolution and subsequent radiation of the major components of the Australian flora
- the theory and practical application of techniques used to recognize and describe botanical diversity
- the interpretation and generation of phylogenetic trees
- the patterns of biological diversity evident at various taxonomic levels (from populations to classes) and the relevance of the various types of data (*e.g.* from molecular to morphological data) employed to resolve the patterns of botanical diversity
- the relevance of knowledge about biological diversity to conservation biology

Description: This unit of study introduces students to the practical aspects of plant systematics and evolution. Students will gain a working knowledge of the general techniques and approaches used in plant systematics (including an understanding of plant taxonomy, phylogenetics and evolutionary processes). A range of data sources (nucleotide sequences and morphology) will be used to address questions concerning the evolution, classification and historical biogeography of various plant groups.

A two-day field trip will provide tuition in plant identification and an opportunity to acquire skills in field botany.

This unit of study is recommended for students with an interest in the areas of: botany, plant science, horticulture, fungal biology (including plant pathology), environmental science, bioinformatics and ecology. It is often combined with units of study offered through the School of Biological Sciences and the Faculty of Agriculture, Food and Natural Resources.

Assessment: 1 x 2-hr take-home exam (45%); oral presentation (5%); nomenclature exercise (15%); research project (35%).

Recommended References:

Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevenson, P.F., Donohuge, M.J. (2002) *Plant Systematics: A Phylogenetic Approach. 2nd edition*. Sinauer Associates Inc.

UNIT COORDINATOR: A/Professor M Henwood
☎ 9351 3262 murray.henwood@sydney.edu.au **Rm**: 308 Heydon-Laurence Building (A08)

STUDENT/STAFF LIAISON COMMITTEE

The staff of the School of Biological Sciences are available at all times to discuss with students in the School any problems or difficulties that might arise concerning units of study in Biology.

In the first instance, difficulties and/or questions should be brought to the attention of the lecturer. If the problem is a more general one, affecting a number of students or the whole class, the best person to approach is the unit coordinator of the unit of study. The names of the unit coordinator for each Senior Biology unit of study are listed at the end of each unit of study in this booklet.

The School has a Student/Staff Liaison Committee, which conducts two meetings each semester (one meeting for Senior students and another combined meeting for Junior and Intermediate students). Student Representatives are elected to the Committee from each unit of study in Biology. Each Student Representative is asked to bring before the Committee any matters of general concern to their fellow students, and to report on the current progress of the unit of study. The unit of study coordinators are members of the Committee and the Chair of the School's Teaching Committee is Chair of the Committee.

Discussions at Committee meetings are informal, but are carried out in a way that allows suitable action to be taken to solve identified problems.

ACADEMIC HONESTY

Academic honesty is a core value of the University of Sydney. The University is committed to the basic academic right that students receive due credit for work submitted for assessment. This requires that all work you submit for assessment represents your own research and your own writing. It is clearly unfair for students to submit work for assessment that dishonestly represents the work of others as their own. Such activity is called plagiarism and is a form of fraud.
All students must be familiar with the University's policy on academic honesty at:

http://sydney.edu.au/ab/policies/Academic_Honesty_Cwk.pdf

All work submitted for assessment must be accompanied by a signed compliance statement certifying that you have read the University policy on plagiarism and that the submitted work is your own. This declaration will form part of the cover sheet information for all submitted work.

Plagiarism
Plagiarism is broadly defined as presenting another person's ideas, findings or written work as one's own by copying or reproducing them without due acknowledgment of the source. Plagiarism includes: copying or paraphrasing the work of another student; using a published author's text or argument without giving a reference; and copying material verbatim from a text or website (whether or not you provide a reference). Plagiarism also includes co-writing an assignment with another student rather than as an individual.

There are extremely severe penalties for plagiarism, including expulsion from the University. All cases of plagiarism must be reported to the University Registrar and remain permanently on a student's record. A guide to avoiding plagiarism is available at:

http://www.library.usyd.edu.au/elearning/learn/plagiarism/index.php

RELEASE OF MARKS

While the School might release raw marks of progressive assessment scores, the only official result is the final result. The final result can be modified at both Departmental and Faculty levels before being released officially by the Registrar.

SEMESTER 1 TIMETABLE PLANNER

Use this grid to help plan your timetable for Semester 1. The possible times for each Senior unit of study are given on page 4 of this booklet.
(Note that the University Timetabling Unit will assign you to specific lecture and practical times where there are repeat classes during the week and you must attend those classes to which you are assigned.)

SEMESTER 1 SENIOR BIOLOGY UNITS OF STUDY

BIOL3010/3910 : Tropical Wildlife Biology and Management (S1 Intensive – refer to page 4 for pre-semester timetable)

BIOL3017/3917: Fungi in the Environment (S1 Intensive – refer to page 4 for pre-semester timetable)

BIOL3006/3906: Ecological Methods

BIOL3011/3911: Ecophysiology

BIOL3012/3912: Animal Physiology

BIOL3013/3913: Marine Biology

BIOL3018/3918: Gene Technology and Genomics

PLNT3003/3903: Systematics and Evolution of Plants

	Mon	Tues	Wed	Thu	Fri
8 - 9					
9 - 10					
10 - 11					
11 - 12					
12 - 1					
1 - 2					
2 - 3					
3 - 4					
4 - 5					
5 - 6					

SEMESTER 2 TIMETABLE PLANNER

Use this grid to help plan your timetable for Semester 2. The possible times for each Senior unit of study are given on page 4 of this booklet.
(Note that the University Timetabling Unit will assign you to specific lecture and practical times where there are repeat classes during the week and you must attend those classes to which you are assigned.)

SEMESTER 2 SENIOR BIOLOGY UNITS OF STUDY

BIOL3016/3916: Coral Reef Biology (S2 Intensive – refer to page 4 for pre-semester timetable)
BIOL3008/3908: Marine Field Ecology (S2 Intensive – refer to page 4 for pre-semester timetable)
BIOL3009/3909: Terrestrial Field Ecology (S2 Intensive – refer to page 4 for pre-semester timetable)
BIOL3007/3907: Ecology
BIOL3025/3925: Evolutionary Genetics and Animal Behaviour
BIOL3026/3926: Developmental Genetics
PLNT3001/3901: Plant, Cell and Environment
PLNT3002/3902: Plant Growth and Development

	Mon	Tues	Wed	Thu	Fri
8 - 9					
9 - 10					
10 - 11					
11 - 12					
12 - 1					
1 - 2					
2 - 3					
3 - 4					
4 - 5					
5 - 6					