



**UNSW**  
AUSTRALIA

Faculty of Science  
School of Biological, Earth and Environmental  
Sciences



# BIOS 6692 Advanced Underwater Field Ecology

Summer session U1, 2016

Contributions from:

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## 1. Staff

Position	Name	Email	Consultation times and locations	Contact Details
Course Convenor	Dr Adriana Verges	a.verges@unsw.edu.au	Room: 617	Ph: 9385 2110
Lecturer	Dr Damon Bolton	d.bolton@unsw.edu.au	Room: 570	Ph: 9385 3447; 0430059308
Tutor	Kingsley Griffin	k.griffin@unsw.edu.au	Room: 570	

## 2. Course information

Units of credit: **6 units of credit**

Pre-requisite(s): *needed prior to course start date.*

**Open Water Diving certification** - [Contact Abyss Scuba Diving](#)

**Occupational\* Dive Medical certificate** – [Dr Pritti Bhatt at the Sydney Aviation Medical Centre](#)

*\*NOTE: this is not a recreational dive medical*

Teaching times and locations:

[www.bees.unsw.edu.au/bios6692](http://www.bees.unsw.edu.au/bios6692)

[www.handbook.unsw.edu.au](http://www.handbook.unsw.edu.au)

[www.timetable.unsw.edu.au](http://www.timetable.unsw.edu.au)

### 2.1 Course summary

This course is an intensive field-based course offering students advanced practical training in conducting marine ecological field studies underwater. This course will facilitate learning of safe research practices in marine ecology by exposing students to a wide variety of equipment, methodologies and training. A major focus of this course will be for students to obtain the unrestricted scientific diver qualifications necessary to perform marine research under current WHS regulations. Students will gain practical experience and insight into the constraints of conducting field based research in the marine environment. This course will enable students to be registered for SCUBA diving based research at UNSW.

Assumed knowledge: [BIOS1101 Evolutionary and Functional Biology](#) and [BEES2041 Data Analysis for Life and Earth Sciences](#).

### 2.2 Course aims

This course aims to develop confident and competent scientific divers that are able to combine advanced diving skills and general scientific research practices. This course will provide practical experience in freediving, SCUBA diving and an array of equipment and

methods used to collect data underwater. This course will also provide practical training in general experimental design, data analysis and scientific writing. This course will ultimately equip students with the skills necessary to undertake high quality, rigorous and safe underwater research, either in higher degree studies or industry-based careers.

## 2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Locate and interpret current peer-reviewed literature in marine ecology and demonstrate critical assessment of current knowledge.
2. Create and carry out scientifically sound research programs in subtidal marine ecology that comply with current WHS regulations.
3. Identify and demonstrate confident use of the most appropriate sampling equipment and methods to address scientific questions in subtidal marine ecology.
4. Clearly communicate research findings in written and oral formats suitable for scientific disciplines.

## 2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcome (PLO)	Related Tasks & Assessment
CLO 1	Find relevant peer-reviewed literature, interpret main findings and apply them to current knowledge gaps and research problems.	<p>Develop and sustain an interest in and knowledge of Science.</p> <p>Develop the habit of seeking and recognising relationships between phenomena, principles, theories, conceptual frameworks and problems</p> <p>Promote understanding of the significance of science, technology, economics and social factors in modern society, and of the contributions they can make in improving material conditions</p>	Scientific diver certification, independent field reports
CLO 2	Develop creative, rigorous and appropriate sampling designs and field studies to answers specific hypotheses to address identified knowledge gaps.	<p>Encourage curiosity and creative imagination and an appreciation of the role of speculation in the selection and solution of problems, the construction of hypotheses, and the design of experiments</p> <p>Develop an appreciation of scientific criteria and a concern for objectivity and precision</p> <p>Develop confidence and skill in</p>	Scientific diver certification, field skills practicals, independent field projects

		formulating problems and in treating both qualitative and quantitative data	
CLO 3	Select the right method and equipment to collect data adequate for answering identified problems and demonstrate confident application.	Develop a working knowledge of scientific methods of investigation  Provide opportunities for the development of students' motivations and social maturity, and an awareness of their capabilities in relation to a choice of career which will be fruitful to themselves and to society	Scientific diver certification, field skills practicals.
CLO 4	Clearly communicate scientific research to a wide audience.	Develop the ability and disposition to think logically, to communicate clearly by written and oral means, and to read critically and with understanding  Provide opportunity to study science in combination with other disciplines	Recreational SCUBA diving, independent field projects & oral presentations.

### 3. Strategies and approaches to learning

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#### 3.1 Learning and teaching activities

This course comprises of online pre-reading and assessments, field skill practicals, face-to-face lectures and tutorials and a final independent field project.

**Online pre-reading and assessments** will be through the course Moodle page and through PADI online material, covering all the theory and knowledge reviews for the dive certifications.

**Pre-reading** will prepare students for the diving practicals, in-water assessments and first aid certifications. This needs to be completed prior to the course commencing for students to be allowed to participate.

**On-line assessments** will include knowledge reviews and final assessments for the diving and first aid certifications and will be completed after in-water and classroom practicals.

**Field skill practicals** will be run out of the Sydney Institute of Marine Science (SIMS) and are a major focus of this course. They will train students in a wide range of diving skills and the use of SCUBA in marine ecological research. Skills will be assessed as part of the diving certifications as well as various scientific applications (using different equipment and methodologies, identifying different species of algae, invertebrates and fish, standardised data collection for global databases, etc.).

**Face-to-face lectures and tutorials** will be run in a collaborative way, encouraging discussion over monologues. These sessions are designed to supplement the field skills as well as teaching rigorous scientific design practices. Students will be expected to participate in open discussion to create a guided peer-to-peer learning environment. Through the process of developing an **independent field project**, you will demonstrate the application of underwater field skills and scientific theory that is gained through this course.

## 3.2 Expectations of students

An integral part of this course is the completion of pre-readings *prior* to the first week. This is critical to progress through rapid and consecutive SCUBA diving and first aid certifications. Please bear in mind that the first week is highly demanding - expect to be physically exerted by the end of it! **BEFORE ENROLLING**, make sure you are confident you can complete this. If you are concerned about this, please contact Adriana Vergés or Damon Bolton to discuss this further.

As this is an intensive course, 100% attendance is required to pass (however, in extenuating circumstances, allowances may be made). This includes online, field practicals and face-to-face time. You may fail the course if your attendance falls below these requirements, even if you complete all assessments.

As a fundamental component of this course is group/team work, you are expected to be respectful of others. Disrespectful/abusive behaviour will not be tolerated and can be grounds for penalties set out under appendix B of the [student misconduct procedure](#).

## 4. Course schedule and structure

This course consists of ~30 hours of class contact hours per week. You are expected to take an additional ~15 hours of non-class contact hours per week to complete pre-reading, on-line learning tasks and assessments.

Locations for diving will be finalised closer to the 28<sup>th</sup> as they are weather dependent, this will be communicated through the course Moodle page.

Week 1					
Pre-reading and Assessment	Diving: Approx. 3 hrs - Reading course manual and completing knowledge reviews. First Aid: Approx. 4.5 hrs - Reading, knowledge reviews and video.		Diving: Approx. 5 hrs - eLearning (reading, watching videos and knowledge reviews)		Approx. 3 hrs Reading and study for exam
Training	Adv. Open Water + First Aid		Rescue Diver		Scientific Diver
Date	28-Nov	29-Nov	30-Nov	1-Dec	2-Dec
Day	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 AM	Meet at location	Meet at location	Meet at location	Meet at location	Meet at location
9:30 AM	Paperwork Dive1  Dive2	Oxygen First Aid	In water training	In water training	In water training
10:00 AM					
10:30 AM					
11:00 AM					
11:30 AM					
12:00 PM					
12:30 PM	Lunch	Lunch	Lunch	Lunch	Lunch
1:00 PM	First Aid Theory	Dive 3  Dive 4	Cont.	Cont.	Cont.
1:30 PM					
2:00 PM					
2:30 PM					
3:00 PM					
3:30 PM					
4:00 PM					
4:30 PM					
5:00 PM					
5:30 PM					
6:00 PM	Dinner - Provided				Dive planning task
6:30 PM					Review physics of diving
7:00 PM					Night Dive

Week 2					
Pre-reading and Assessment		Continue learning Marine Life of Sydney and Reef Life Survey skills			
Training	Field skills/Practicals			Independent Field Projects	
Date	5th Dec	6th Dec	7th Dec	8th Dec	9th Dec
Day	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 AM	Meet at Mat 228	Meet at Mat 228	Meet at location	Field sampling/ collecting data	Cont.
9:30 AM	Health&Safety: Dive proposal review.  Assessment 4	Reef Life Survey theory.	Measuring herbivory and predation  BRUVS, UVC		
10:00 AM					
10:30 AM					
11:00 AM					
11:30 AM					
12:00 PM	Lunch	Lunch	Lunch		
12:30 PM		Meet at location	Meet at Mat 228		
1:00 PM	Marine Life Syd.	RLS Practical	Experimental design		
1:30 PM					
2:00 PM					
2:30 PM	Freediving theory and practical	Break	Break		
3:00 PM		RLS cont'd	Prepare project-specific dive proposals		
3:30 PM					
4:00 PM		Stationary point counts			
4:30 PM	Macrophyte surveys				
5:00 PM					



Week 3					
Pre-reading and Assessment	Finding, reading and summarising relevant scientific literature.				
Training	Data processing, analysis, presentation & write up				
Date	12th Dec	13th Dec	14th Dec	15th Dec	16th Dec
Day	Monday	Tuesday	Wednesday	Thursday	Friday
9:00 AM	Meet at Mat 228	Meet at Mat 228	Meet at Mat 228	Meet at Mat 228	Meet at Mat 228
9:30 AM	Assessment 5	Data processing	Analysing data and finalising results of independent project	Making good graphs and figures	Assessment 6  Writing final report...
10:00 AM	Data processing software: Squidle/CPCe/ImageJ				
10:30 AM					
11:00 AM					
11:30 AM					
12:00 PM	Lunch	Lunch	Lunch	Lunch	
12:30 PM					
1:00 PM	Data processing from ind. field projects	Cont.	Cont.	Prepare a presentation	
1:30 PM					
2:00 PM					
2:30 PM	Break	Break	Break	Break	
3:00 PM	Cont.	Data exploration graphing and exploratory stats		Cont.	
3:30 PM					
4:00 PM					
4:30 PM					
5:00 PM					

## 5. Assessment

Assessment task	Knowledge & abilities assessed	Assessment criteria	Length	Weight	Mark	Due date	Feedback	
							When:	How:
<b>Assessment 1, 2 &amp; 3:</b> <b>Based on results attained in Dive Qualification final exams</b>	SCUBA diving theory knowledge and demonstrate confident and safe diving skills	Comprehension of all material covered in pre-reading and adequately completing in-water practicals	NA	30%  (10% per diving qualification exam)	Out of 10	During the first week (28 <sup>th</sup> Nov. – 2 <sup>nd</sup> Dec.), generally after each dive certification.	Throughout the first week	Verbal communication & marks
<b>Assessment 4:</b> <b>Dive specific WHS Moodle quiz.</b>	Knowledge and compliance with health and safety guidelines at UNSW	Comprehension of material covered during face-to-face time	10 multiple choice questions	10%	Out of 10	5 <sup>th</sup> December	After assessment completion	Marks will be instantly available and discussed during class
<b>In water skills – demonstrating confidence and ability</b>	The ability to adequately and safely use various equipment and methods for collecting data underwater	Demonstrating competent and correct use of specific sampling equipment and methods on SCUBA	NA	Satisfactory or Un-satisfactory	Observations made by demonstrators	Observations during class practicals 5 <sup>th</sup> , 6 <sup>th</sup> & 7 <sup>th</sup> December	After assessment completion	Verbal communication from demonstrator
<b>Assessment 5:</b> <b>Taxonomy Moodle quiz – based on Marine Life of Sydney and Reef Life Survey</b>	Knowledge of marine taxonomy and understanding the importance of standardised sampling for global data sharing	Identifying marine organisms to a fine scale of classification with a high degree of accuracy	20 multiple choice questions	10%	Out of 20	12 <sup>th</sup> December	After assessment completion	Marks will be instantly available and discussion during class
<b>Freediving technique – demonstrate confidence and ability</b>	Knowledge and understanding of breath hold theory and the ability to safely freedive	Demonstrating competent and correct freediving techniques within personal limitations	NA	Satisfactory or Un-satisfactory	Observations made by demonstrators	Observations during class practicals Monday 5 <sup>th</sup> December	After assessment completion	Verbal communication from demonstrator

<b>Assessment 6:</b> <b>Group presentations – presenting results of independent field projects to your choice of audience.</b>	The ability to communicate the aims, methods and result of a marine science study, in plain English, to a wide audience background. The ability to critically assess peers	Demonstrating good time management, clear presentation skills (slide design, organisation and delivery) and understanding of the study.	10 mins + Questions	10%	Out of 20, 10 marks from tutor/10 marks average peer marks	In class on Thursday 15 <sup>th</sup> December	One week after the assessment	Peer and demonstrator feedback
<b>Assessment 7:</b> <b>Independent field reports – in a peer-reviewed scientific report format.</b>	Ability to design a sampling program able to test specific hypothesis. Ability to conduct ecological research in the field. Ability to prepare scientific report	Completion of tasks, correct analysis and presentation of results. Effective communication of results to a scientific audience	2500 words (not incl. figures, tables or references)	40%	Out of 50	20 <sup>th</sup> December (TBC)	Three weeks after submission	Marks and written comments

**Where appropriate, assessment outlines will be available through Moodle.**

**Further information**

UNSW grading system: <https://student.unsw.edu.au/grades>

UNSW assessment policy: <https://student.unsw.edu.au/assessment>

## 6. Academic integrity, referencing and plagiarism

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**Referencing** is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.

Referencing styles can depend on the desired place of publication, so there is no set style for this course. Referencing should be consistent throughout assessment (i.e. not using multiples styles simultaneously or jumping from one to another), if in doubt please ask for help.

Further information about referencing styles can be located at

<https://student.unsw.edu.au/referencing>

Endnote is a reference manager program available free to students through [UNSW IT](#), it is recommended to use a referencing manager and help using it will be provided during the course.

**Academic integrity** is fundamental to success at university. Academic integrity can be defined as a commitment to six fundamental values in academic pursuits: honesty, trust, fairness, respect, responsibility and courage.<sup>1</sup> At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

Further information about academic integrity and **plagiarism** can be located at:

- The *Current Students* site <https://student.unsw.edu.au/plagiarism>, and
- The *ELISE* training site <http://subjectguides.library.unsw.edu.au/elise/presenting>

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: <https://student.unsw.edu.au/conduct>.

## 7. Readings and resources

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### **Recommended reading:**

*Available through the main library and may be borrowed from course convenor*

Kingsford, M. and C. Battershill (eds) (1998). *Studying Temperate Marine Environments: A Handbook for Ecologists*, Canterbury University Press. (Can be borrowed from Rochelle Johnston, rm550, Biological Sciences)

### **Additional reading:**

Levinton, JS (2001) *Marine biology* Oxford Univ. Press, Oxford.

Nybakken, JW (2001) *Marine biology: an ecological approach*. Benjamin Cummings, San Francisco.

Barnes, RSK & RN Hughes (1999) *Introduction to marine ecology*, 2nd ed. Blackwell Scientific, Oxford.

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<sup>1</sup> International Center for Academic Integrity, 'The Fundamental Values of Academic Integrity', T. Fishman (ed), Clemson University, 2013.

Bertness, MD., JF Bruno, BR Silliman, and JJ Stachowicz (eds) (2014). *Marine Community Ecology and Conservation*. Sinauer Associates, Sunderland.

Begon, M., JL Harper and CR Townsend (1996). *Ecology: Individuals, populations and communities*, 3rd ed. Blackwell Scientific, Oxford.

Boulton AJ & MA Brock (1999) *Australian freshwater ecology: Processes and management*. Gleneagles Publishing, Glen Osmond.

Clayton, MN and RJ King (eds) (1990). *Biology of marine plants*. Longman Cheshire, Melbourne.

Connell SD, Gillanders BM (eds) (2007) *Marine Ecology*. Oxford University Press.

Hammond LS and RN Synott (eds) (1994) *Marine biology*. Longman Cheshire, Melbourne.

Underwood, AJ & MG Chapman (eds) (1995). *Coastal marine ecology of temperate Australia*. UNSW Press, Sydney.

### **Further:**

Reference to studies in the primary literature (i.e. original studies in journal articles rather than textbooks) will form an important part of the course.

The following list includes the most important general ecology journals and the major journals that are devoted entirely, or in large part, to marine ecology, freshwater ecology, or marine botany:

Aquaculture, ***Annual Review of Ecology and Systematics***, Aquatic Botany, Botanica Marina, Coral Reefs, Ecological Monographs, ***Ecology***, Ecology Letters, European Journal of Phycology, Freshwater Biology, Hydrobiologia, ***Journal of Experimental Marine Biology and Ecology***, Journal of the Marine Biological Association of the UK, Journal of Marine Research, Journal of Phycology, Limnology and Oceanography, Marine Biology, ***Marine Ecology Progress Series***, Marine and Freshwater Research, ***Nature***, Nature Climate Change, Oceanography and Marine Biology, Annual Review, ***Oecologia***, Oikos, Phycologia, Phycological Research, ***PNAS***, ***Science***, Trends in Ecology and Evolution, ***Science of The Total Environment***

(This list is by no means exhaustive, and of course articles are scattered throughout the biological literature).

## **8. Administrative matters**

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<b>Assignment Submissions</b>	The major report (independent field projects) must be submitted by 5 pm on the due date through Moodle. For reports submitted up to seven (7) days late a 10% per day penalty applies. Reports submitted more than seven (7) days late will not be marked. If medical grounds preclude submission of report by due date, contact should be made with Damon Bolton as soon as possible. A medical certificate will be required for late submission on medical grounds and must be appropriate for the extension period.
<b>Risk Management</b>	Information on relevant Health and Safety policies and expectations can be found at: <a href="http://www.bees.unsw.edu.au/risk-management">www.bees.unsw.edu.au/risk-management</a> <a href="http://www.bees.unsw.edu.au/health-and-safety">www.bees.unsw.edu.au/health-and-safety</a>
<b>Equity and</b>	Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs

<b>Diversity</b>	<p>with the course convener prior to, or at the commencement of, this course, or with the Equity Officer (Disability) in the Equity and Diversity Unit -</p> <p>Phone: 9385 4734</p> <p>Web: <a href="https://student.unsw.edu.au/disability-contacts">https://student.unsw.edu.au/disability-contacts</a></p> <p>Issues to be discussed may include access to materials, signers or note-takers, the provision of services and additional exam and assessment arrangements. Early notification is essential to enable any necessary adjustments to be made.</p>			
<b>Grievance Contacts</b>	<p><b>Course</b></p> <p>It is always advised to discuss issues with the course convenor or lecturer as the first contact.</p>	<p><b>School</b></p> <p>If you would prefer, the school grievance officer is:</p> <p>Dr Jes Sammut j.sammut@unsw.edu.au Ph: 9385 8281</p>	<p><b>Faculty</b></p> <p>Dr Chris Tisdell Associate Dean (Education) <a href="mailto:cct@unsw.edu.au">cct@unsw.edu.au</a> Ph: 9385 7112</p>	<p><b>University</b></p> <p>Graduate Research School Ph: 9385 5500 University Counselling Services Ph: 9385 5418</p>

## 9. Additional support for students

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- The Current Students Gateway: <https://student.unsw.edu.au/>
- Academic Skills and Support: <https://student.unsw.edu.au/academic-skills>
- Student Wellbeing, Health and Safety: <https://student.unsw.edu.au/wellbeing>
- Disability Support Services: <https://student.unsw.edu.au/disability-services>
- UNSW IT Service Centre: <https://www.it.unsw.edu.au/students/index.html>