UNSW SYDNEY

Faculty of Science
School of Biological, Earth and Environmental Sciences

BIOS2091 | MSCI9001
Marine & Aquatic Ecology

Term 3 2021


Photo: Adriana Vergés

Contributions from:
A/ Prof Adriana Vergés, Prof Alistair Poore,
Prof Peter Steinberg, Prof Emma Johnston

BIOS2091 | MSCI9001

Marine and aquatic ecology

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Course information

Year of Delivery	2021
Course Code	BIOS2091 & MSCI9001
Course Name	Marine and Aquatic Ecology
Academic Unit	School of Biological, Earth and Environmental Sciences
Level of Course	3rd year, undergraduate
Units of Credit	6 UOC
Session(s) Offered	T3
Assumed Knowledge, Prerequisites or Co-requisites	MSCI1001
Hours per Week	6
Number of Weeks	10
Commencement Date	Monday 13th September, 2021

Summary of Course Structure (for details see 'Course Schedule')

Component	HPW	Time & Day	Location
Lectures, seminars and debates	3	Monday 10am Monday 1pm Tuesday 2pm	All online. Monday 10am session is interactive
Fieldwork and/ or laboratory practicals	4	Wednesday 9-1pm	Online and interactive
TOTAL	7		

NB: Some of this information is available on the UNSW Virtual Handbook:
http://www.handbook.unsw.edu.au/undergraduate/courses/2018/BIOS2091.html

Staff Involved in the course

Staff	Role	Name	Contact Details
Course Convenor		A/Prof Adriana Vergés	a.verges@unsw.edu.au Ph: 9385 2110
Additional Teaching Staff	Lecturers & Facilitators	A/Prof Alistair Poore Prof Paul Gribben Dr Steph Gardner A/Prof Suhelen Egan Dr Torsten Thomas Prof Tracey Rogers Prof Richard Kingsford Dr Laura Parker	a.poore@unsw.edu.au p.gribben@unsw.edu.au s.gardner@unsw.edu.au s.egan@unsw.edu.au t.thomas@unsw.edu.au tracey.rogers@unsw.edu.au richard.kingsford@unsw.edu.au l.parker@unsw.edu.au
	Tutors & Demonstrators	TBC	
	Technical & Laboratory Staff	Suzy Evans	s.evans@unsw.edu.au
	Other Support Staff		

Course details

Course Description (Handbook Entry)	Ecology of marine and freshwater systems, emphasising benthic communities. Population and community dynamics of these systems. Evolution of life histories in the light of constraints of aquatic systems. Emphasis on experimental approaches to aquatic ecology. Special topics considered include chemical ecology, plant/herbivore ecology, and applied aspects of the topic such as mariculture. A section on the biology and taxonomy of marine algae (seaweeds) is included. Fieldwork is an important component of the course.
Course Aims	The course is aimed to provide an understanding of the processes that govern the ecology of aquatic habitats with a major emphasis on the ecology of marine coastal systems, and particularly the experimental analysis of benthic communities. Marine systems are then compared to streams and both freshwater and saline lakes.
Student Learning Outcomes	At the end of the course, students should be able to discuss the relative importance of the major ecological processes structuring marine and freshwater communities. They will have experience in each of the steps involved in the ecological research that has given rise to such knowledge. These are: 1) the careful formulation of hypotheses, 2) the design of field experiments and sampling, 3) collection of data, 4) data analysis, and interpretation, and 5) communication of results via scientific reports. Students should be familiar with the application of ecological data to applied problems in marine and freshwater habitats (pollution, habitat loss, overfishing, flow regulation, marine reserves).

Graduate Attributes Developed in this Course		
Science Graduate Attributes	**The level of FOCUS** *0 = NO FOCUS* *1 = MINIMAL* *2 = MINOR* *3 = MAJOR*	**Activities / Assessment**
Research, inquiry and analytical thinking abilities	3	Class research projects, Independent research projects (all assessed)
Capability and motivation for intellectual development	3	Students design their own research project (assessed). Links in course materials to current research activities at UNSW
Ethical, social and professional understanding	3	Links in course material to applied problems in marine and aquatic habitats. Recognition that a diverse range of views are held on ecological issues.
Communication	3	Written reports (for scientific audiences), Oral presentations
Teamwork, collaborative and management skills	3	Independent group research project & oral presentations (assessed as report)
Information literacy	0	

Major Topics (Syllabus Outline)	Major topics to be covered include: • experimental marine ecology of rocky shores, kelp forests, soft sediment communities, coral reefs and seagrass beds • ecology of streams and lakes • life histories of marine invertebrates and algae • marine chemical ecology • marine microbiology • applied aspects of marine and freshwater ecology (pollution, disturbance, overfishing, biotechnology and biofouling, marine reserves and flow regulation). • marine conservation biology
Relationship to Other Courses within the Program	BIOS2091 shares its lectures and some assessments with MSCI9001 Conservation in aquatic ecosystems BIOS2091 is intended to complement BIOS3081 Ocean to Estuarine Ecosystems, which is the third year offering in marine science. Study of ecological processes and field experimentation also form part of BIOS3601 Advanced Field Biology, BIOS3671 Conservation Biology and Biodiversity, BIOS2011 Evolutionary & Physiological Ecology, and BEES2041 Data Analysis for Life and Earth Sciences. Many honours and postgraduate projects conducted within the school involve research in marine ecology.

Rationale and strategies underpinning the course

Teaching Strategies	The **lectures** are organised around key ecological processes that shape different marine and aquatic habitats (rocky shores, kelp forests, coral reefs, etc) and also focus on current marine conservation issues. Lectures provide the key theoretical concepts and examples of experiments conducted to test hypotheses about the functioning of aquatic habitats. The **practical sessions** and **field trips** provide an opportunity to gain experience in the design, conduct and communication of ecological experiments in the field. The class will conduct one experiment that has already been designed, and groups of students will design their own sampling programs in independent research projects.
Rationale for learning and teaching in this course	The focus on experimental ecology in the lecture and practical material was chosen as it this approach that has been particularly powerful in advancing our understanding of marine and aquatic ecology. The ability to design and conduct rigorous experiments, analyse the resultant data, and communicate the results in written and oral form are skills essential for graduates seeking employment in this field.

BIOS2091 & MSCI9001: Marine & Aquatic Ecology | Sessions in green are online and recorded (you can watch in your own time)
Sessions in yellow are online and interactive – please log on at the appropriate time via the zoom links provided.

Week	Session	Date	Time	Lecturer	Topic
Week 1	Lec 1	13/9/21	10am - interactive	Adriana Vergés	Introduction to the course
	Lec 2	13/9/21	1pm - recorded	Peter Steinberg	Larval & supply ecology 1
	Lec 3	14/9/21	2pm - recorded	Peter Steinberg	Larval & supply ecology 2
	Prac	15/9/21	*9-10 am interactive*	*Adriana Vergés*	*Q & A discussion: Deconstructing science*
			10-1 pm interactive	Adriana Vergés	Opinions in Ecology & Independent Field Projects
Week 2	Lec 1	20/9/21	10am - interactive	CMSI postgraduate students	Research bites
	Lec 2	20/9/21	1pm - recorded	Paul Gribben	Species interactions: Competition & Facilitation
	Lec 3	21/9/21	2pm - recorded	Paul Gribben	Marine invaders: Establishment to impact
	Prac	22/9/21	*9-10 am interactive*	*Paul Gribben*	*Q & A discussion: invasion ecology*
			10-1 pm interactive	Adriana Vergés & demonstrators	Independent Field Projects: preparation
Week 3	Lec 1	27/9/20	10am - interactive	Adriana Vergés	Debate 1
	Lec 2	27/9/21	1pm - recorded	Adriana Vergés	Species interactions: Herbivory & Predation
	Lec 3	28/9/21	2pm - recorded	Steph Gardner	Coral reefs
	Prac	29/9/21	*9-10 am interactive*	*Steph Gardner*	*Q & A discussion: coral reefs*
			10-1 pm interactive	Adriana Vergés	Independent Field Projects: preparation & feedback proposal
Week 4	*Lec 1*	*4/10/21*	*Public holiday*	*NO SESSION TODAY*	
	Lec 2	*4/10/21*	*Public holiday*		
	Lec 3	5/10/21	2pm - recorded	Adriana Vergés	Kelp forests
	Prac	6/10/21	*9-10 am interactive*	*Adriana Vergés*	*Q & A discussion: kelp forests*
			10-1 pm interactive	Adriana Vergés & demonstrators	Independent Field Projects: data collection
Week 5	Lec 1	11/10/21	10am - interactive	Adriana Vergés	Debate 2
	Lec 2	11/10/21	1pm - recorded	Adriana Vergés	Seagrass meadows
	Lec 3	12/10/21	2pm - recorded	Alistair Poore	Algal diversity

Assessment

Week	Session	Date	Time	Lecturer	Topic
Week 5	Prac	13/10/21	*9-10 am interactive*	*Alistair Poore*	*Q & A discussion: algal diversity*
			10-1 pm interactive	Adriana Vergés & demonstrators	Independent Field Projects: data collection
Week 6		*20/10/21*	*Break*		
Week 7	Lec 1	25/10/21	10am - interactive	Adriana Vergés	Debate 3
	Lec 2	25/10/21	1pm - recorded	Torsten Thomas	Microbial diversity
	Lec 3	26/10/21	2pm - recorded	Suhelen Egan	Marine holobionts
	Prac	27/10/21	*9-10 am interactive*	*Torsten Thomas*	*Q & A discussion: microbial diversity*
			10-1 pm interactive	Adriana Vergés & demonstrators	Independent Field Projects: data analysis
Week 8	Lec 1	1/11/21	10am - interactive	Adriana Vergés	Debate 4
	Lec 2	1/11/21	1pm - recorded	Adriana Vergés	Threats to marine populations
	Lec 3	2/11/21	2pm - recorded	Tracey Rogers	Conservation of marine megafauna
	Prac	3/11/21	*9-10 am interactive*	*Tracey Rogers*	*Q & A discussion: marine megafauna*
			10-1 pm interactive	Adriana Vergés & demonstrators	Independent Field Projects: Presentations
Week 9	Lec 1	8/11/21	10am - interactive	Adriana Vergés	Debate 5
	Lec 2	8/11/21	1pm - recorded	Laura Parker	Impacts of climate change on marine ecosystems
	Lec 3	9/11/21	2pm - recorded	Richard Kingsford	Desert Rivers
	Prac	10/11/21	*9-10 am interactive*	*Laura Parker*	*Q & A discussion: climate change*
			10-1 pm interactive	Adriana Vergés	Independent Field Projects: Presentations
Week 10	Lec 1	15/11/21	10am - interactive	Adriana Vergés	Debate 6
	Lec 2	15/11/21	1pm - recorded	Richard Kingsford	Freshwater management: problems
	Lec 3	16/11/21	2pm - recorded	Richard Kingsford	Freshwater management: solutions
	Prac	17/11/21	*9-10 am interactive*	*Richard Kingsford*	*Q & A discussion: freshwater conservation*
			10-1 pm interactive	Adriana Vergés	Feedback session and exam Q & A

BIOS2091 | Assessment 2021

Task	Knowledge & abilities assessed	Assessment Criteria	% of total mark	Date of		Feedback		
				Release	Submission	WHO	WHEN	HOW
Moodle quizzes and class discussions	Continuous learning assessment of: - knowledge of the ecological processes structuring marine and freshwater habitats, - ability to critically assess the structure of published scientific articles and extract relevant information.	Moodle quizzes: Comprehension of material covered in lectures, seminars and practical classes.	10%	15th Sept	Throughout the term.	A/Prof Adriana Vergés	During practical sessions	Marks and oral comments
		Class discussions: Effective identification and presentation of structural elements and key knowledge presented in scientific articles.	5%					
Opinions in ecology	Ability to read ecological literature critically. Ability to write and present a persuasive argument orally.	Extent of research. Effective written communication of scientific controversy to a wide audience, in writing and orally.	10%	15th Sept	Written article. *On day of assigned debate (9 am)*	A/Prof Adriana Vergés	Two weeks after submission	Marks & written/ oral comments
		Extent of research. Effective persuasive oral communication of scientific controversy to a wide audience	5%		Debate. *On day and time of assigned oral debate*			
Independent field project report	Ability to design a sampling program to test specific hypotheses. Ability to plan and conduct ecological research in the field. Ability to write a scientific report and prepare a scientific presentation.	Effective planning of research, including experimental design.	10%	15th Sept	Proposal **5th October** *(5 pm)*			
		Completion of field and/ or lab tasks, correct analysis and presentation of results. Effective communication of results as a scientific paper.	20%		Report **2nd November** *(5 pm)*			
		Effective communication of research and results to a scientific audience.	5%		Oral presentation **3rd and 10th November**			
Final exam*	Knowledge of the ecological processes structuring marine and freshwater habitats. Ability to contrast functioning of ecosystems across habitats studied.	Comprehension of all material covered in lectures, seminars and practical classes	35%	Date set by exam office				

MSCI9001 | Assessment 2021

Task	Knowledge & abilities assessed	Assessment Criteria	% of total mark	Date of		Feedback		
				Release	Submission	WHO	WHEN	HOW
Moodle quizzes and class discussions	Continuous learning assessment of: - knowledge of the ecological processes structuring marine and freshwater habitats, - ability to critically assess the structure of published scientific articles and extract relevant information.	Moodle quizzes: Comprehension of material covered in lectures, seminars and practical classes.	7.5%	15th Sept	Throughout the term.	A/Prof Adriana Vergés	During practical sessions	Marks and oral comments
		Class discussions: Effective identification and presentation of structural elements and key knowledge presented in scientific articles.	2.5%					
Opinions in ecology	Ability to read ecological literature critically. Ability to write and present a persuasive argument orally.	Extent of research. Effective written communication of scientific controversy to a wide audience, in writing and orally.	10%	15th Sept	Written article. *On day of assigned debate (9 am)*	A/Prof Adriana Vergés	Two weeks after submission	Marks & written/ oral comments
		Extent of research. Effective persuasive oral communication of scientific controversy to a wide audience	5%		Debate. *On day and time of assigned oral debate*			
Independent field project report	Ability to design a sampling program to test specific hypotheses. Ability to plan and conduct ecological research in the field. Ability to write a scientific report and prepare a scientific presentation.	Effective planning of research, including experimental design.	15%	15th Sept	Proposal **5th October** *(5 pm)*			
		Completion of field and/ or lab tasks, correct analysis and presentation of results. Effective communication of results as a scientific paper.	20%		Report **2nd November** *(5 pm)*			
		Effective communication of research and results to a scientific audience.	5%		Oral presentation **3rd and 10th November**			
Final exam*	Knowledge of the ecological processes structuring marine and freshwater habitats. Ability to contrast functioning of ecosystems across habitats studied.	Comprehension of all material covered in lectures, seminars and practical classes	35%	Date set by exam office				

Resources for students

Text Books	Connell, SD and BM Gillanders (eds) (2007) *Marine ecology*. Oxford University Press Availability: UNSW bookshop, UNSW library, Open Reserve
Course Manual	You are reading it! (available as pdf from Moodle)
Required Readings	Lecture notes for each section of the course will suggest recommended readings from the text and other sources of information. 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* (This list is by no means exhaustive, and of course articles are scattered throughout the biological literature).
Additional Readings	Bertness, MD., JF Bruno, BR Silliman, and JJ Stachowicz (eds) (2014). *Marine Community Ecology and Conservation*. Sinauer Associates, Sunderland. Scientific articles and other primary references provided during lectures.
Recommended Internet Sites	**Course web page (Moodle)** Lecture outlines, data sets from practicals, instructions for assessment and other useful resources will be posted throughout the session on the BIOS2091/ MSCI9001 web page. You will need to log on (using your student number and zPass) to Moodle: http://moodle.telt.unsw.edu.au/

Required Equipment, Training and Enabling Skills

Equipment Required	All required equipment will be provided during practicals/ lab sessions.
Enabling Skills Training Required to Complete this Course	**Students are required to observe WHS regulations during the fieldtrip and practicals. Safety should be your top priority during fieldtrips and lab classes.** If you are unsure of any procedures, please consult with staff. All lectures, practicals and seminars/ debates will take place in a laboratory setting, **where wearing covered shoes is compulsory**. During the Microbiology practical sessions held in the laboratory **it is**

	compulsory to wear laboratory coats and covered shoes. Students cannot be admitted to these classes without these items. Additional safety requirements will be announced at the start of each practical. During field trips, it is essential to wear non-slip covered shoes that you are prepared to get wet. Students also need to wear appropriate clothing for the weather e.g. rain jackets if raining or hats and sunscreen if sunny. Extra care must be taken on the rocky shore due to wave action.

Course evaluation and development

Student feedback is gathered periodically by various means. Such feedback is considered carefully with a view to acting on it constructively wherever possible. This course outline conveys how feedback has helped to shape and develop this course.

Mechanisms of Review	Last Review Date	Comments or Changes Resulting from Reviews
Major Course Review	2021	Changes associated with moving this unit from 3rd year (3091) to 2nd year (2091) and with adapting to COVID19 restrictions and teaching online only, including practicals.
	2019	Changes associated with moving from 12 weeks to 10 weeks under UNSW's T3 has resulted in a change in schedule, with all lectures/ labs and fieldwork concentrated on a single day. Flipped activities and new fieldwork practicals were introduced.
	2010	Revision of lecture material with greater focus on marine conservation issues (given lecture material is shared with MSCI9001 Conservation in aquatic ecosystems)
	2008	The change from 14 week to 12 week sessions involved the removal of one of the written reports with assessment of practical exercise being moved to the final exam.
	2006	Course revised to add independent group research projects and replace oral debates with written Opinions in Ecology essays.
MyExperience		The course is periodically evaluated. The current approach to obtain feedback from students is via MyExperience. While the responses are generally overwhelmingly positive, several changes resulting from these evaluations have been implemented through time, including a reduction in the number of written reports, more fieldwork, more time allocated to the independent research projects, more help to be available on the preparation of written reports, and a reduced value for the final exam.

Administration matters

Expectations of Students	**Attendance at all sessions is expected.**
Assignment Submissions	**School policy for late report submission** 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 a report by the due date, contact should be made with the course convenor as quickly as possible. A medical certificate will be required for Special Consideration and late submissions based on medical grounds and must be appropriate

	for extension period. **Assignment extensions will not be considered under any other circumstances.**
Health and Safety[1]	Information on relevant Health and Safety policies and expectations at UNSW can be accessed online http://www.safety.unsw.edu.au/staff-student-resources/students Please note that to ensure your safety at UNSW during the COVID-19 pandemic, you must complete the COVID-19 Module on Moodle before the start of term. Please refer to this information at any time during term as needed.
Assessment Procedures	The final examination will be scheduled by the Examinations Office. Students should be available for examination throughout the entire UNSW end-of-session examination period. Supplementary examinations will only be granted to students who miss the final examination due to illness or other unexpected reasons outside their control. A student who wishes to apply for a supplementary examination should contact the course coordinator as soon as the problem becomes apparent, and should apply for special consideration. Special consideration cannot be given for students who have planned or wish to plan any holiday trips or return flights home before the end of the examination period. If a supplementary examination is granted, it will normally be held before the beginning of the next session. Until then, you should maintain a current address with SIS, and be available for contact and assessment. For information on examinations see https://my.unsw.edu.au/student/academiclife/assessment/examinations/examinations.html). If illness or misadventure intervenes to prevent a student meeting an assessment deadline or class meeting then he/she should contact the lecturer in charge of the assessment. The conditions for special consideration are given at https://student.unsw.edu.au/special-consideration.
Equity, Diversity & Inclusion	Inclusion is when "a diversity of people (e.g. of different ages, cultural backgrounds, genders) feel valued and respected, have access to opportunities and resources, and can contribute their perspectives and talents to improve their organisation" (Diversity Council Australia, 2019). We aim to create an inclusive classroom environment that enables students to feel supported and a strong sense of belonging, regardless of identity or background. UNSW has numerous resources to assist with this, including: UNSW Ally, Counselling and Psychological Services, Disability Services, International Student Support, Student Support Advisors, The Learning Centre, Nura Gili, Pregnancy and Parenting Support, Diversity Champions. Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the course coordinator (A/ Prof Adriana Vergés prior to, or at the commencement of, their course, and with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or http://www.studentequity.unsw.edu.au/). UNSW Science also has an Academic Disability Advisor, John Wilson (J.E.Wilson@unsw.edu.au). 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.

[1] UNSW Occupational Health and Safety: www.riskman.unsw.edu.au/ohs/ohs.shtml

<table>
<tr><td>Student Complaint Procedure[2]</td><td colspan="3">In all cases you should first try to resolve any issues with the course convenor (A/Prof Adriana Vergés).

If this is unsatisfactory, you should contact the Director of Teaching (A/Prof Stephen Bonser, s.bonser@unsw.edu.au) or the Deputy Head of School (A/Prof Scott Mooney s.mooney@unsw.edu.au) who is the School's Grievance Officer and Designated Officer under the UNSW Plagiarism Procedure.

UNSW has formal policies about the resolution of complaints that are available online for review (see https://student.unsw.edu.au/complaints).</td></tr>
<tr><td></td><td>School Contact</td><td>Faculty Contact</td><td>University Contact</td></tr>
<tr><td></td><td>A/Prof Scott Mooney
Deputy Head of School (Undergraduate Programs)
s.mooney@unsw.edu.au
Tel: 9385 8063</td><td>Prof Simon Killcross
Acting Deputy Dean (Education)
s.killcross@unsw.edu.au
Tel: 9385 3034
or

A/Prof Scott Mooney
Associate Dean (Undergraduate Programs)
s.mooney@unsw.edu.au
Tel: 9385 8063</td><td>Head of Student Lifecycle
clare.jones@unsw.edu.au
Tel: 9385 3087

University Counselling and Psychological Services[3]
Tel: 9385 5418
counselling@unsw.edu.au</td></tr>
</table>

[2] UNSW Complaints Procedure: https://student.unsw.edu.au/complaints
[3] University Counselling and Psychological Services https://student.unsw.edu.au/counselling

UNSW academic honesty and plagiarism

What is Plagiarism?

Plagiarism is the presentation of the thoughts or work of another as one's own.
*Examples include:

- direct duplication of the thoughts or work of another, including by copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;
- paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;
- piecing together sections of the work of others into a new whole;
- presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and
- claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

For the purposes of this policy, submitting an assessment item that has already been submitted for academic credit elsewhere may be considered plagiarism.

Knowingly permitting your work to be copied by another student may also be considered to be plagiarism.

Note that an assessment item produced in oral, not written, form, or involving live presentation, may similarly contain plagiarised material.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does *not* amount to plagiarism.

The Learning Centre website is main repository for resources for staff and students on plagiarism and academic honesty. These resources can be located via:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

- correct referencing practices;
- paraphrasing, summarising, essay writing, and time management;
- appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne

QUESTION & ANSWER DISCUSSIONS and MOODLE QUIZZES: DECONSTRUCTING SCIENCE

This year the pre-recorded lecture content will be complemented with interactive, live Question & Answer discussions with individual lecturers.

The intention of these sessions is to provide an opportunity for students to ask any questions relevant to the lecture material and to discuss and 'deconstruct' a relevant scientific paper.

The format of the Q&A Discussions will be introduced and discussed during the first online practical session on Wednesday 15th September 2021. The first formal Q&A Discussion will be Wednesday 22nd September 2021.

In each Paper Discussion session there will be 5 to 6 students who will have 3-5 minutes to discuss one of the following:

1. Overview of research topic: why the question at hand is important
2. What is the specific knowledge gap tackled by the study?
3. Methods overview: how did the authors tackle the research question?
4. Results overview: what did the authors find?
5. Discussion: are the findings consistent with previous research?
6. Conclusion: what do we know now that we didn't know before?

All students will be sent the paper the Friday before the session and will be expected to have read it. Each student will be randomly allocated a Paper Discussion session and a point of discussion.

The content of the lectures and the paper discussion will be examinable via a series of short online Moodle quizzes, which will be uploaded on a weekly basis.

RESEARCH BITES SESSION:
BEES Marine & Aquatic Research

A wide variety of **marine and freshwater research** is conducted by staff and students at UNSW. This includes the School of Biological, Earth and Environmental Sciences (BEES), the School of Mathematics and Statistics, School of Biotechnology & Biomolecular Sciences (BABS), the Evolution & Ecology Research Centre (E&ERC), the Centre for Marine Science and Innovation (CMSI), the Climate Change Research Centre (CCRC) and the Centre for Ecosystem Science (CES).

We will expose you to a broad range of current research projects within BEES via the series of lectures and via a dedicated '**Research Bites**' seminar, happening on:

Monday 20th Sept 2021, 10am

In these sessions current BEES PhD postgraduate students will present their research.

The content of these sessions will be examinable.

Students interested in further study via Honours should familiarise themselves with the research activities of the various laboratories and talk to relevant staff, their research fellows and their students. The formal requirements for entry into Honours and postgraduate programs and further details on research activities can be found on the Honours BEES web page (https://www.bees.unsw.edu.au/honours).

Here's a list of BEES academics that work in the aquatic and marine realm.

Associate Professor Tracy Ainsworth is a microbial ecologist based at the School of BEES whose research largely focuses on coral reef ecosystems and climate change impacts. Her research has re-evaluated the role of bacterial communities in coral bleaching and she has developed novel methods for analysis of coral bacterial communities. She has ongoing projects in both the Great Barrier Reef and the NSW coastline.

Professor Rob Brander, a.k.a. 'Dr Rip' is a coastal geomorphologist in the School of BEES. His research focuses on the morphodynamics of coastal nearshore systems including the interaction between wave action and beach morphology and related coastal management issues. Recent projects include relating physical measurements of rip current flow on beaches around Australia to beachgoers' perception, understanding and response to the rip current hazard. He leads the Science of the Surf program and also has ongoing projects related to the vulnerability of coral reef-islands in the Great Barrier Reef and Maldives.

Dr Mark Browne is a Senior Research Associate at the School of BEES. As an ecologist, his research aims to understand the impacts of human activities (priority pollutants, plastic debris, urbanization) on marine biodiversity. He collaborates closely with colleagues at a wide range of national and international institutions, enabling a strong multi-disciplinary approach. He is particularly interested in the scientific basis for managing environmental problems and he advises governments and industry on this.

Associate Professor Suhelen Egan is a microbial ecologist based at the School of BEES who specializes on host-microbe interactions, marine biotechnology, molecular biology, -omics technologies and ecology. Much of her recent research has focusesd on understanding the diversity and function of the seaweed microbiome.

Professor Matthew England is a Scientia Professor of Climate Dynamics at the School of BEES and the Climate Change Research Centre. His expertise covers the dynamics of the oceans and their role in climate variability and climate change on time-scales of seasons to millennia.

Associate Professor Paul Gribben's research investigates the processes driving marine biodiversity. His interdisciplinary approach combines fundamental life-history theory, behavioural ecology and community ecology to better our understanding of the response of marine communities to global change. His research is conducted in a wide range of ecosystems including mangrove forests, seagrasses, intertidal sand flats, rocky shores and kelp forests. Current research projects include: 1) factors determining the spread and impacts of marine invaders, 2) processes structuring intertidal marine communities across continents, 3) role of sediment microbes in estuarine plant interactions, and 4) understanding how habitat-forming species facilitate biodiversity. PhD and Honours students in his group conduct research throughout Australia and internationally.

Professor Emma Johnston is currently the Dean of Science at UNSW. Her research combines the disciplines of ecotoxicology and subtidal ecology in an original research program that both progresses our understanding of fundamental ecology, and provides insights and recommendations for the management of marine systems. Her research is conducted in the laboratory and in such diverse field environments as Antarctica, the Great Barrier Reef and temperate Australian estuaries. Emma's group includes postdocs, research assistants and students at all levels (PhD, Masters, Honours and undergraduates). They approach research from both an ecological and ecotoxicological perspective using field experimentation wherever possible. Recent projects include: 1) Determining the major drivers of marine invasion, 2) Developing a system for assessing estuarine health and 3) Comparing the vulnerability of Antarctic assemblages to those of other regions.

Professor Richard Kingsford is the director of the Centre for Ecosystem Science (CES). His research group focuses on the ecology of inland rivers, their wetlands and dependent biota, particularly waterbirds. Recent projects include: 1) examining the distribution and extent of wetlands across New South Wales to determine representativeness in conservation reserves, 2) effects of diminishing river flows on the ecology of the Macquarie Marshes and Lowbidgee wetlands, and 3) changes in waterbird communities in relation hydrological regulation of floodplain lakes.

Dr Angela Mira Maharaj is a lecturer at the School of BEES and the Climate Change Research Centre. Her research focuses on understanding the role of the ocean in climate variability, particularly through satellite oceanography.

Dr Mariana Mayer-Pinto is a Scientia Fellow at the School of BEES. Her research broadly focuses on human impacts on marine ecosystems. Mariana uses ecological theory and experimental field ecology in innovative ways to understand the mechanisms by which anthropogenic stressors (e.g. priority pollutants, urbanization) affect biodiversity and ecosystem function across a wide range of marine habitats, with a strong focus on solution-based research. She is a Chief Investigator of the Living Seawalls project, which uses green engineering to enhance the ecological performance of artificial structures.

Professor Katrin Meissner is the Director of the Climate Change Research Centre at the School of BEES. She is interested in abrupt climate change events as well as thresholds and feedbacks in the climate system. She uses Earth System Climate

Models in conjunction with paleoclimate records to improve our understanding of the basic mechanisms underlying climate variability and climate change, particularly in the context of terrestrial biogeochemical cycles and ocean circulation.

Dr Laurie Menviel is a Scientia Fellow at the Climate Change Research Centre in the School of BEES. She combines numerical experiments and paleoproxy records to study climate-carbon cycle interactions on centennial to glacial timescales.
She is particularly interested in the impact of water masses changes on the climate and the marine carbon cycle.

Dr Laura Parker is an Indigenous Scientia Fellow and ARC DAATSIA Fellow.
She is interested in understanding and overcoming the impacts of climate change and environmental stress on marine organisms. Her research focuses specifically on building resilience in marine molluscs to current (e.g. salinity, food availability) and future (e.g. ocean warming and acidification) stressors and understanding the underlying physiological, molecular and epigenetic mechanisms involved. Through her research, Laura aims to develop new capacities to 'future-proof' natural oyster populations and the Australian oyster industry, and contribute to the restoration of degraded oyster habitats that are of enormous importance to Indigenous Australians. Her research is currently supported by an ARC Discovery Indigenous grant titled “The basis of oyster resilience to global environmental change”.

Professor Alistair Poore is Head of the School of BEES. He conducts research into the ecology and evolution of species interactions among marine invertebrates, algae and seagrasses. Current research projects include: 1) the effects of herbivores on marine communities, 2) the ways in which consumers can tolerate plant chemical defences, 3) the evolution of host plant selection by marine herbivores, 4) effects of pollution on the invertebrate fauna inhabiting rocky reefs, and 5) tolerance of urchins and crustaceans to ocean warming and acidification.

Professor Tracey Rogers conducts multidisciplinary research to understand the ecology of marine mammals, particularly Antarctic seals. Current research projects within her Mammal Lab group examine the potential impacts of climate warming on the Southern Ocean ecosystem and how these changes will influence the pack-ice seals. The research uses a number of different techniques for studying foraging and spatial use behaviour of seals, including stable isotope analysis, stress and reproductive hormone analysis, satellite telemetry and acoustic surveying.

Associate Professor Jes Sammut conducts research involving sustainable aquaculture, coastal resource management, diseases of aquatic organisms and the aquatic impacts of coastal development. He is involved in aid and development work in Asia, particularly in the aquaculture and agriculture sectors. Recent projects include: 1) remediation and management of degraded earthen shrimp ponds in Indonesia and Australia, 2) identification of risk factors causing Sydney Rock Oyster production losses, 3) land capability assessment for land-based aquaculture, 4) planning tools for marine fin-fish cage culture, and 5) restoration of tsunami-impacted aquaculture ponds in Aceh.

Associate Professor Alex Sen Gupta is based at the Climate Change Research Centre in the School of BEES. His research revolves around the role of the ocean in the climate system, how the ocean influences regional climate and what global climate models tell us about the future of the ocean.

Professor Iain Suthers is head of the Fisheries and Marine Environmental Research Facility at the School of BEES. His research group is interested in fish ecology, biological oceanography and human impacts on coastal environments. Recent projects have included 1) tracing nutrient pathways in coastal ecosystems using stable carbon and nitrogen isotopes, 2) determining the importance of physical mechanisms in blooms of plankton in coastal and estuarine systems, 3) the use of zooplankton size structure as an environmental monitoring tool, and 4) restocking of harvested fish in estuaries.

Professor Torsten Thomas is the Director of the Centre for Marine Science and Innovation. His research focuses on the interaction of bacteria with their environment and aims to understand the function of the enormous diversity of bacteria in natural systems. He explores the microbial world, for example by high-throughput DNA sequencing and uses bioinformatics to make predictions about functional and ecological properties of bacterial communities. Current projects include 1) Bacteria-sponge symbiosis, 2) Microbial conversion of coal to methane, 3) Functional diversity and redundancy of marine communities, 4) Antibiotics and resistance in the marine environment and 5) Genomics of evolving, bacterial populations.

Associate Professor Adriana Vergés is a marine ecologist at the School of BEES Her research focuses on the ecology and conservation of coastal marine communities such as algal forests, coral reefs and seagrass meadows. Her research group investigates the ecological impacts of climate change in marine ecosystems and develops solutions for the conservation of the world's algal forests and seagrass meadows, which are increasingly under threat. Most of her research is experimental and takes place underwater, with a SCUBA tank strapped to her back. Adriana is a Founder and Chief Investigator of Operation Crayweed and Operation Posidonia, two projects that seek to restore underwater forests and meadows in Sydney and beyond. She is passionate about science communication and the merging of art and science.

Please note that an Honours research project in marine or freshwater ecology needs not be restricted to these topics or staff, and joint projects with other staff members, and external supervisors (e.g., at NSW Fisheries, Australian Museum, EPA) can be considered.

OPINIONS IN ECOLOGY

"*Marine ecology has long ceased being a spectator sport*"
Stephen Palumbi, Stanford University

While ecologists are usually a mild-mannered and reasonably friendly bunch, there are occasions when practicing scientists disagree strongly on various issues. It is quite common for different researchers to hold contrasting views on the importance of various processes in marine and aquatic ecology, and what sort of research should be done. Such debate is often healthy for the science, but can leave new students confused as to what we know in ecology. Such confusion proves a particular problem when we need to communicate ecological knowledge to environmental managers or politicians.

In this exercise, students will be allocated a topic that has been contentious and will be asked to write a popular science **article** and participate in a **class debate** arguing for one particular side (rather than review both sides of the debate). In doing so, you will need to acknowledge the criticisms of the concept you are supporting, and then argue against those criticisms. To do this successfully, you will need to read the literature critically, and select arguments and examples that support your side of the debate.

The article should be written in the style of a **popular science article** and may be illustrated with figures and tables.

The topics put forward will emphasise issues that link marine and aquatic ecology to practical problems in conservation and management of coastal environments. It is in these areas where scientists need to be able to clearly argue their point of view.

ALLOCATION OF TOPICS:

At the beginning of the course, students will be allocated a topic from the list below, as well as a side of the debate. There will be up to 4 students independently working on the same topic/ side of the debate. Everyone has to write their own popular science article, but then you need to get together as a group to prepare for the debate.

Debate 1: Sustainable whaling should be allowed
27th Sept 2021

Debate 2: Ecologists have a duty to be environmental activists
11th October 2021

Debate 3: We oversell ocean catastrophes
25th Oct 2021

Debate 4: We need 'assisted evolution' to save the world's coral reefs
1st Nov 2021

Debate 5: The world's focus on plastic pollution distracts us from tackling more damaging environmental problems in our oceans
8th Nov 2021

Debate 6: Sustainable aquaculture is key to feed the world's growing population
15th Nov 2021

ASSIGNMENT DUE DATE:
The six debates are distributed throughout the course, between the 27th Sept and 15th of November as detailed above.

The due date for the popular science article for each student will be at 9am on the day of the allocated debate.

All article submissions are individual. For the debate, you will be graded both on the basis of how you perform individually and how the whole team (i.e. your side of the debate) present the motion in a unified and cohesive way

In-class Debate:

All debates include an affirmative and a negative view, with **up to eight students** participating in each session and speaking for 5 minutes each with the following basic structure:

- Affirmative group – 2 students x 5 minutes to present their case to the audience
- Negative group – 2 students x 5 minutes to present their case to the audience
- Affirmative group rebuttal – 1 student x 5 minutes
- Negative group rebuttal – 1 student x 5 minutes
- Affirmative group summary & conclusion – 1 student x 5 minutes
- Negative group summary & conclusion – 1 student x 5 minutes
- Decision on the motion and class discussion – 10 minutes

All the students arguing for the same side of the debate need to meet prior to the debate as a team to agree on how they are going to be presenting their arguments in a cohesive way.

Popular science article: The overall writing style should be targeting a general audience, e.g. see articles published by The Conversation. The text needs to include citations, which may be text hyperlinks or can be included as reference citations/ footnotes. Please include a reference list at the end of the assignment. **Word limit: 800 words** (not including references).

Finding references. Below you will find links to scientific articles to start your research on each topic, but you are expected to read extensively beyond the suggested references. Don't rely on Google and Wikipedia to find all your information! Comment pieces in journals such as Science and Nature can often point towards appropriate literature, and websites like The Conversation can also offer useful starting points. While your arguments may be guided by these popular science articles, your arguments need to be based and supported by scientific papers. The best databases for finding scientific literature are Google Scholar, Scopus and the ISI Web of Knowledge. Use the general search for finding papers on given topics or by certain authors. Use the cited reference search to find recent papers that have cited a given paper. This allows you to go forward in time from the introductory references given below.

STARTING REFERENCES FOR OPINIONS IN ECOLOGY

Debate 1: Sustainable whaling should be allowed
27th Sept 2021

Bejder, M., D. W. Johnston, J. Smith, A. Friedlaender, and L. Bejder. 2016. Embracing conservation success of recovering humpback whale populations: Evaluating the case for downlisting their conservation status in Australia. Marine Policy **66**:137-141.

Cote, I. M., and C. J. M. P. Favaro. 2016. The scientific value of scientific whaling. Marine Policy **74**:88-90.

Normile, D. 2019. Japan's exit from whaling group may benefit whales. Science **363**:110-111.

Debate 2: Ecologists have a duty to be environmental activists
11th Oct 2021

Kaiser, J and KS Brown. 2000. Ecologists on a mission to save the world. *Science* 287: 1188-1195.

Pace, M. L., S. E. Hampton, K. E. Limburg, E. M. Bennett, E. M. Cook, A. E. Davis, J. M. Grove, K. Y. Kaneshiro, S. L. LaDeau, G. E. Likens, D. M. McKnight, D. C. Richardson, and D. L. Strayer. 2010. Communicating with the public: opportunities and rewards for individual ecologists. Frontiers in Ecology and the Environment **8**:292-298.

Debate 3: We oversell ocean catastrophes
25th Oct 2021

Duarte, C. M., R. W. Fulweiler, C. E. Lovelock, P. Martinetto, M. I. Saunders, J. M. Pandolfi, S. Gelcich, and S. W. Nixon. 2015. Reconsidering Ocean Calamities. Bioscience **65**:130-139.

Duarte, C. M., S. Agusti, E. Barbier, G. L. Britten, J. C. Castilla, J.-P. Gattuso, R. W. Fulweiler, T. P. Hughes, N. Knowlton, C. E. Lovelock, H. K. Lotze, M. Predragovic, E. Poloczanska, C. Roberts, and B. Worm. 2020. Rebuilding marine life. Nature **580**:39-51.

Debate 4: We need 'assisted evolution' to save the world's coral reefs
1st Nov 2021

van Oppen, M. J. H., J. K. Oliver, H. M. Putnam, and R. D. Gates. 2015. Building coral reef resilience through assisted evolution. *Proceedings of the National Academy of Sciences* 112:2307-2313.

Gross, M. 2018. Can science rescue coral reefs? *Current Biology* **26**:R481-R484.

Debate 5: The world's focus on plastic pollution distracts us from tackling more damaging environmental problems in our oceans
8th Nov 2021

Stafford, R., and P. J. Jones. 2019. Viewpoint–Ocean plastic pollution: A convenient but distracting truth? Marine Policy **103**:187-191.

Avery-Gomm, S., T. R. Walker, M. L. Mallory, and J. F. Provencher. 2019. There is nothing convenient about plastic pollution. Rejoinder to Stafford and Jones “Viewpoint–Ocean plastic pollution: A convenient but distracting truth?”. Marine Policy **106**:103552.

Debate 6: Sustainable aquaculture is key to feed the world’s growing population

15th Nov 2021

Costello, C., L. Cao, S. Gelcich, M. Á. Cisneros-Mata, C. M. Free, H. E. Froehlich, C. D. Golden, G. Ishimura, J. Maier, I. Macadam-Somer, T. Mangin, M. C. Melnychuk, M. Miyahara, C. L. de Moor, R. Naylor, L. Nøstbakken, E. Ojea, E. O’Reilly, A. M. Parma, A. J. Plantinga, S. H. Thilsted, and J. Lubchenco. 2020. The future of food from the sea. Nature **588**:95-100.

Olaussen, J. O. 2018. Environmental problems and regulation in the aquaculture industry. Insights from Norway. Marine Policy **98**:158-163.

INDEPENDENT FIELD PROJECTS

Introduction (Wednesday 15th September 2021)

Understanding the ecology of organisms in field conditions, and the subsequent communication of results involves the following steps:
1) the careful formulation of hypotheses,
2) the design of field experiments and/or sampling,
3) collection of data
4) data analysis and interpretation
5) communication of results via scientific reports.

In this exercise, you will get together in small groups of **5 students for BIOS2011** and **4 students for MSCI9001** to gain experience in all of these steps, including the formulation of your own hypotheses and sampling designs.

Due to COVID19 restrictions in doing fieldwork this year, we will be using digital data sources including underwater photographs, underwater videos and other image resources to design the project this year.

Planning (Wednesday 22nd and 29th September 2021)

Groups of students will sign up for research topics that can be addressed through extracting online and/ or digital data.

A list of topics will be made available via Moodle and will be discussed during the first planning session.

Each group will select a research topic and brainstorm ideas to formulate a statement of hypotheses, a sampling design to test these hypotheses and a list of equipment needed to carry out the fieldwork.

At the end of the planning sessions, students should have:
- formed groups,
- swapped contact details,
- collected/ downloaded the initial reading material
- commenced planning the field exercise
- determine what hypotheses are being tested
- determine explicit sampling design (i.e., how many sites, times, replicates etc.)
- determine what data will be collected and from what sources
- establish what statistical methods will be used to analyse the data
- prepared a list of equipment they will need to carry out the field work

During the second planning session, students will also have the opportunity to brainstorm and obtain feedback on their proposal from lecturers and demonstrators.

Independent field projects data collection

Each group will conduct the field work independently, in their own time. There will be no practical sessions during weeks 4 and 5 to allow groups to do this work.

Independent field projects data analysis (by week of 27th October 2021)

Groups will have an opportunity to discuss and brainstorm data analysis questions with the demonstrators and the lecturer. These sessions sessions will be booked with demonstrators during the project and should happen before 29th October 2021.

Independent Field Project Assignment structure

This project will be assessed via three distinct components: a research proposal, a scientific report and an oral presentation.

1: Research proposal

Word limit: 1000 words

NOTE: Although the research will be done as a group, the proposal document is individual.

Each student will be required to prepare a research proposal outlining and justifying their specific work plans. Writing a proposal is an essential step in performing scientific research. We generally submit proposals to funding bodies such as the Australian Research Council or the NSW Environmental Trust, who decide whether to invest money on the proposed research on the basis of two main criteria:

Scientific quality – this includes the clarity of the hypotheses or research objectives, the strength of the experimental design and the feasibility of the proposed research

Significance and innovation – this relates to the overall importance of the research. Will it increase our knowledge in a meaningful way? Does it apply new ideas/ methods/ approaches that may be useful in other projects?

The proposal should have the following sections:

Project title: Make it short (< 25 words) and descriptive. Avoid using acronyms.

Project summary: In no more than 100 words of plain language, summarise aims, significance and expected outcomes.

Background and aims: Here you need to provide a rationale for the project. This will involve defining the problem assessed by your research (establishing the research 'territory') and developing a clear research question (establishing the a 'niche' or 'knowledge gap'). This section should include a 'mini' literature review component, where you summarise what we already know about the topic being researched. You should end with one (or more) clear aims. These aims can be phrased as statements, questions or hypotheses. For example:

Statement example:
"The overarching aim of this project is to quantify the impacts of coastal tropicalisation to marine food webs."

Question example:
"This project proposes to citizen science photographs to answer two questions:
(1) Is fish biodiversity greater inside marine protected areas?
(2) Does fish biodiversity increase towards the tropics?"

Hypothesis example:
"We will use quantitative surveys to investigate the following hypothesis:
(1) There is a negative relationship between kelp and urchin abundance in NSW"

Approach and methodology: Here you outline the experimental design and the methods that will be used. This needs to provide enough details so that we can assess whether the design is sound. So, for example, you need to clearly explain what the factors in the experimental design are, whether they are fixed or random, the number of replicates, etc.

You should make sure you consult this with your instructors during the planning sessions, as they can provide highly valuable feedback.

Significance and innovation: Here you describe the importance of the research problem being addressed. You should also describe how the anticipated outcomes will advance the knowledge base of the discipline and why the aims and/ or approach are novel and innovative.

Logistics, timeline and personnel: This section should summarise the role, responsibilities and contributions of all the members of your group. You should also include a timeline for the project including key dates for task completion.

Acknowledgements (including PERMITS): Acknowledge any help you may have received preparing the application and detail any permits required to be used for the research.

References: Include a list of all references used throughout the proposal.

Research proposal marking scheme

The marks will be allocated as follows:

Summary (15)
Background and aims (25)
Approach & methodology – overall description (15)
Approach & methodology – experimental design (25)
Significance & innovation (15)
Logistics, timeline & personnel (5)

Total (100)

2. Independent field project scientific report

Word limit: 1500 words + graphs and tables as needed.

The report on this experiment should be presented as a scientific report in a format as if this was to be submitted to the marine ecological journal *Marine Ecology-Progress Series* (MEPS). Thus your report should have the following sections:

Title page,
Abstract,
Keywords,
Text (Introduction, Materials and Methods, Results, Discussion),
Figures and Tables,
Acknowledgements
Literature Cited.

The hypotheses being tested should be clearly stated in the Introduction.

The Methods section may be kept brief but include enough details so that your experimental design/ sampling could be reproduced/ repeated by another researcher. This section must include information on the statistical tests used to analyse the data.

The Results section is where you present your data as text, figures and tables, including the results of any statistical analyses.

The Discussion section is where you place your results in the context of previous work and where you discuss the implications of your data. Do not repeat the Results in this section! You should explain whether your results are consistent with the work of others, and if not you may speculate about why that may be.

Independent field project report: marking scheme

The marks will be allocated to sections of the report as follows:

Abstract (10)
Introduction (20)
Materials and methods (10)
Results
- Text (10)
- Figures (10)
- Analyses (10)

Discussion (30)

Total (100)

3: Oral presentation on field projects

Each group is required to present a short talk on their field project. The aim is to present the main findings of your research to the rest of the class.

Your presentation should include:

- Background information on your project (i.e., what's the knowledge gap targeted)
- The specific hypotheses you aimed to test and details of your experimental design
- The methods used to test the hypotheses

- Your results and their interpretation

Your challenge is to do all that within **10 minutes**. Every student is expected to speak.

You can download your presentation from the cloud as appropriate during the class. The presentations will be retained for marking. Please make sure to detail the name of all group participants on either the first or the last slide.

Oral presentation marking scheme

The marks will be allocated as follows:

Clarity of research question – 20
Clarity of experimental design – 20
Clarity of results – 20
Clarity of interpretation of results – 20
Overall presentation style/ engagement/ timing – 20

Total (100)