BIOL373

Marine Ecology

S1 Day 2016

Dept of Biological Sciences

Contents

General Information

Unit convenor and teaching staff
Convenor
Jane Williamson
jane.williamson@mq.edu.au

Credit points
3

Prerequisites
39cp including BIOL227(P)

Corequisites

Co-badged status

Unit description
This unit covers the ecology of temperate marine communities, including: intertidal and subtidal rocky reefs; kelp forests; mangroves; seagrasses; soft sediments; and the deep ocean. Key processes mediating each habitat are explored and both natural and anthropogenic perturbations to these habitats are discussed. Manipulation of our marine environment, with reference to aquaculture, fisheries, introduced species, climate change and conservation issues, is studied. There are also small components dedicated to life histories of marine invertebrates, chemical ecology, larval and adult fish behaviour, and morphology and taxonomy of fish. Specialist lecturing staff from other institutions give guest lectures in their area of expertise.
This unit emphasises the practical application of marine ecological research and has a field component. It provides experience in environmental monitoring and manipulative experiments, including formulating hypotheses, designing experiments, data collection, analyses, and communication of results. A basic knowledge of statistics is assumed. This unit helps prepare individuals for employment in a range of marine-related workplaces, including consultancies and government agencies, and is beneficial for students wishing to continue with postgraduate studies in marine science.

Important Academic Dates

Information about important academic dates including deadlines for withdrawing from units are available at https://www.mq.edu.au/study/calendar-of-dates

Learning Outcomes

On successful completion of this unit, you will be able to:

1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
2. Develop appropriate experimental designs to test hypotheses
3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
9. Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts and popular scientific articles

Assessment Tasks

Name	Weighting	Due
Student Group Project Proposal	8%	10th March
Student Group Project (SGP)	24%	2nd May
Debate Papers	6%	9th May
Science News Story	12%	16th May
Debates	10%	23rd May and 30th May
Final Exam	40%	TBA

Student Group Project Proposal

Due: **10th March**
Weighting: **8%**

Submission of a project proposal for the student group project

On successful completion you will be able to:

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them

Student Group Project (SGP)

Due: **2nd May**
Weighting: **24%**

Submission of a completed student project (written as a group and in the format of a scientific publication), with a signed statement of individual input

On successful completion you will be able to:

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
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- 9. Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts and popular scientific articles

Debate Papers

Due: **9th May**
Weighting: **6%**

Group submission of a recent (2011^{+}) scientific publication supporting your argument for your group debate, and a 1-page written précis of your argument

On successful completion you will be able to:

- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them

Science News Story

Due: **16th May**
Weighting: **12%**

Individual submission of a popular science article on a topic within marine ecology

On successful completion you will be able to:

- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- 9. Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts and popular scientific articles

Debates

Due: **23rd May and 30th May**
Weighting: **10%**

Five minute individual oral presentations of a topic nominated in the 'debate papers' activity (see above) in the form of a debate

On successful completion you will be able to:

- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them

Final Exam

Due: **TBA**
Weighting: **40%**

3-hour written exam at the completion of the unit comprising of short answer and essay questions

On successful completion you will be able to:

- 2. Develop appropriate experimental designs to test hypotheses
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts

- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them

Delivery and Resources

BIOL373 is a 3cp unit offered annually on the internal schedule only. BIOL373 is designed for senior undergraduates with a basic understanding of the marine environment and general ecology. The lectures cover the ecology of temperate marine communities, including intertidal rocky shores, mangroves, seagrasses, soft-sediments, subtidal rocky reefs, and the deep ocean. Key processes mediating each habitat are explored, and both natural and anthropogenic perturbations to these habitats are discussed. There are small components dedicated to chemical ecology, larval and adult fish behavior, and shark ecology. Manipulation of our marine environment, with particular reference to aquaculture and conservation issues, is also studied. Specialist colleagues from other institutions will give a few of the lectures in their area of expertise.

This unit emphasises the practical application of marine ecological research and has a substantial field component in the first half of the semester. It provides experience in environmental monitoring and manipulative experiments, including formulating hypotheses, designing experiments, data collection, analyses, and communication of the results. A basic understanding of statistics (~STAT170) is assumed.

BIOL373 provides students with an extensive understanding of the processes and issues that are advancing the field of marine biology. It conveys the intellectual excitement that is currently developing this science, and to stimulate freethinking and problem solving.

This unit is also extremely valuable for students interested in undergraduate or postgraduate studies in Biology, Ecology, Conservation and Biodiversity, Environmental Studies, Climate Change Science and/or Resource Management. Students from degrees other than Bachelor of Marine Science are encouraged to enrol. BIOL373 helps prepare individuals for employment in a broad range of marine and/or ecologically related workplaces, including consultancies and government agencies, and is beneficial for students wishing to continue with Honours or postgraduate research. It provides a good basis for BIOL773 (Marine Conservation and Management) within the Masters of Science program.

Practical components of BIOL373 rely on student led learning and I will guide you through this process. I hope that by developing your own ideas, based on the information and guidance that I give you, you will find this experience more rewarding than merely being told what to do. Such student led learning, however, works best if there is regular feedback from you, so please work with me throughout the semester to ascertain the optimal amount of help that you need with your questions and progress. I will ask for your feedback on the Unit during the semester and towards the end through formal LEU and LED evaluations. If, however, you have any suggestions for BIOL373 at other times please make an appointment to come and talk to me, or others involved in the unit. Teaching and learning is a two-way process and I encourage your feedback – your opinion is very important to me!

Unit Schedule

Week	Week starting	Lecture	Practical
1	29th February	Introduction	Introductory practical – Introduction and preparation for fieldwork
		Invertebrate life histories	
2	7th March	Rocky Shores I	Student Group Project – field trip to Fairlight
		Rocky Shores II	
3	14th March	Rocky Shores III	Student Group Project - planning & feedback session
		Kelp forests	
4	21st March	Soft sediments	Student Group Project – field trip to Fairlight
		Seagrasses	
5	29th March	*No lecture*	*No practical – Easter Monday*
		Mangroves & salt marshes	
6	4th April	Fish Behaviour	Student Group Project – data analysis and feedback
		No lecture	
Mid-semester break			
7	25th April	*No lecture*	*No practical – Anzac Day*
		Larval fish	
8	2nd May	Chemical Ecology I	Communication in Science – Science News Story
		Chemical Ecology II	
9	9th May	Shark Ecology	Sydney Aquarium
		Recruitment & Fisheries	
10	16th May	Energy and nutrient flows in estuaries	Science News Story – peer review and assessment

		Fisheries bycatch & discarding (guest lecture)	
11	23rd May	Aquaculture I	Debates
		Aquaculture II	
12	30th May	Climate change I	Debates
		Climate change II	
13	6th June	Marine protected areas	*No practical*
		No lecture	

Policies and Procedures

Macquarie University policies and procedures are accessible from Policy Central. Students should be aware of the following policies in particular with regard to Learning and Teaching:

Academic Honesty Policy http://mq.edu.au/policy/docs/academic_honesty/policy.html

New Assessment Policy in effect from Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy_2016.html. For more information visit http://students.mq.edu.au/events/2016/07/19/new_assessment_policy_in_place_from_session_2/

Assessment Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/assessment/policy.html

Grading Policy prior to Session 2 2016 http://mq.edu.au/policy/docs/grading/policy.html

Grade Appeal Policy http://mq.edu.au/policy/docs/gradeappeal/policy.html

Complaint Management Procedure for Students and Members of the Public http://www.mq.edu.au/policy/docs/complaint_management/procedure.html

Disruption to Studies Policy http://www.mq.edu.au/policy/docs/disruption_studies/policy.html *The Disruption to Studies Policy is effective from March 3 2014 and replaces the Special Consideration Policy.*

In addition, a number of other policies can be found in the Learning and Teaching Category of Policy Central.

Student Code of Conduct

Macquarie University students have a responsibility to be familiar with the Student Code of Conduct: https://students.mq.edu.au/support/student_conduct/

Results

Results shown in *iLearn*, or released directly by your Unit Convenor, are not confirmed as they are subject to final approval by the University. Once approved, final results will be sent to your student email address and will be made available in eStudent. For more information visit ask.m

q.edu.au.

Student Support

Macquarie University provides a range of support services for students. For details, visit http://students.mq.edu.au/support/

Learning Skills

Learning Skills (mq.edu.au/learningskills) provides academic writing resources and study strategies to improve your marks and take control of your study.

- Workshops
- StudyWise
- Academic Integrity Module for Students
- Ask a Learning Adviser

Student Services and Support

Students with a disability are encouraged to contact the Disability Service who can provide appropriate help with any issues that arise during their studies.

Student Enquiries

For all student enquiries, visit Student Connect at ask.mq.edu.au

IT Help

For help with University computer systems and technology, visit http://www.mq.edu.au/about_us/offices_and_units/information_technology/help/.

When using the University's IT, you must adhere to the Acceptable Use of IT Resources Policy. The policy applies to all who connect to the MQ network including students.

Graduate Capabilities

Creative and Innovative

Our graduates will also be capable of creative thinking and of creating knowledge. They will be imaginative and open to experience and capable of innovation at work and in the community. We want them to be engaged in applying their critical, creative thinking.

This graduate capability is supported by:

Learning outcomes

- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major

temperate marine ecosystems
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- 9. Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts and popular scientific articles

Assessment tasks

- Student Group Project Proposal
- Student Group Project (SGP)
- Science News Story
- Debates
- Final Exam

Capable of Professional and Personal Judgement and Initiative

We want our graduates to have emotional intelligence and sound interpersonal skills and to demonstrate discernment and common sense in their professional and personal judgement. They will exercise initiative as needed. They will be capable of risk assessment, and be able to handle ambiguity and complexity, enabling them to be adaptable in diverse and changing environments.

This graduate capability is supported by:

Learning outcomes

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
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Commitment to Continuous Learning

Our graduates will have enquiring minds and a literate curiosity which will lead them to pursue knowledge for its own sake. They will continue to pursue learning in their careers and as they participate in the world. They will be capable of reflecting on their experiences and relationships with others and the environment, learning from them, and growing - personally, professionally and socially.

This graduate capability is supported by:

Learning outcomes

- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
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Discipline Specific Knowledge and Skills

Our graduates will take with them the intellectual development, depth and breadth of knowledge, scholarly understanding, and specific subject content in their chosen fields to make them competent and confident in their subject or profession. They will be able to demonstrate, where relevant, professional technical competence and meet professional standards. They will be able to articulate the structure of knowledge of their discipline, be able to adapt discipline-specific knowledge to novel situations, and be able to contribute from their discipline to inter-disciplinary solutions to problems.

This graduate capability is supported by:

Learning outcomes

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
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- Final Exam

Critical, Analytical and Integrative Thinking

We want our graduates to be capable of reasoning, questioning and analysing, and to integrate and synthesise learning and knowledge from a range of sources and environments; to be able to critique constraints, assumptions and limitations; to be able to think independently and systemically in relation to scholarly activity, in the workplace, and in the world. We want them to have a level of scientific and information technology literacy.

This graduate capability is supported by:

Learning outcomes

- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
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Problem Solving and Research Capability

Our graduates should be capable of researching; of analysing, and interpreting and assessing data and information in various forms; of drawing connections across fields of knowledge; and they should be able to relate their knowledge to complex situations at work or in the world, in order to diagnose and solve problems. We want them to have the confidence to take the initiative in doing so, within an awareness of their own limitations.

This graduate capability is supported by:

Learning outcomes

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in

marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 3. Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to marine systems
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 8. Outline special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
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Effective Communication

We want to develop in our students the ability to communicate and convey their views in forms effective with different audiences. We want our graduates to take with them the capability to read, listen, question, gather and evaluate information resources in a variety of formats, assess, write clearly, speak effectively, and to use visual communication and communication technologies as appropriate.

This graduate capability is supported by:

Learning outcome

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings

Assessment tasks

- Student Group Project Proposal
- Student Group Project (SGP)
- Debate Papers
- Science News Story
- Debates

- Final Exam

Engaged and Ethical Local and Global citizens

As local citizens our graduates will be aware of indigenous perspectives and of the nation's historical context. They will be engaged with the challenges of contemporary society and with knowledge and ideas. We want our graduates to have respect for diversity, to be open-minded, sensitive to others and inclusive, and to be open to other cultures and perspectives: they should have a level of cultural literacy. Our graduates should be aware of disadvantage and social justice, and be willing to participate to help create a wiser and better society.

This graduate capability is supported by:

Learning outcomes

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 2. Develop appropriate experimental designs to test hypotheses
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
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Assessment tasks

- Student Group Project Proposal
- Student Group Project (SGP)
- Science News Story
- Debates

Socially and Environmentally Active and Responsible

We want our graduates to be aware of and have respect for self and others; to be able to work with others as a leader and a team player; to have a sense of connectedness with others and country; and to have a sense of mutual obligation. Our graduates should be informed and active participants in moving society towards sustainability.

This graduate capability is supported by:

Learning outcomes

- 1. Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork settings
- 4. Compare and contrast processes that affect the biology and ecology of major temperate marine ecosystems
- 5. Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- 6. Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- 7. Identify mechanisms by which anthropogenic impacts such as climate change will modify marine systems and describe some anticipated impacts
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Assessment tasks

- Student Group Project Proposal
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