



# BIOL373

## Marine Ecology

S1 Day 2014

*Dept of Biological Sciences*

### Contents

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<u>General Information</u>	2
<u>Learning Outcomes</u>	3
<u>Assessment Tasks</u>	3
<u>Delivery and Resources</u>	8
<u>Unit Schedule</u>	9
<u>Policies and Procedures</u>	10
<u>Graduate Capabilities</u>	11

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## General Information

Unit convenor and teaching staff

Other Staff

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Unit Convenor

Jane Williamson

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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:

Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork

Develop appropriate experimental designs to test hypotheses

Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems

Compare and contrast the processes that affect the biology and ecology of major temperate marine ecosystems

Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates

Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this

Explain the importance of global fisheries and aquaculture and evaluate their current ecological status

Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries

Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts

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

Identify the role of marine protected areas to marine systems and describe how marine protected areas work in NSW

Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Assessment Tasks

Name	Weighting	Due
<a href="#">Online Quiz</a>	2%	TBA
<a href="#">Student Project Proposal</a>	8%	TBA

Name	Weighting	Due
<a href="#"><u>Debate Papers</u></a>	2%	TBA
<a href="#"><u>Student Project</u></a>	20%	TBA
<a href="#"><u>Chemical Ecology Report</u></a>	12%	TBA
<a href="#"><u>Debate</u></a>	12%	TBA
<a href="#"><u>Final Exam</u></a>	44%	TBA

## Online Quiz

Due: **TBA**

Weighting: **2%**

A multiple-choice online exercise based on experimental design, field and laboratory safety procedures

On successful completion you will be able to:

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems

## Student Project Proposal

Due: **TBA**

Weighting: **8%**

Student groups will need to submit a project proposal for their student project

On successful completion you will be able to:

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the processes that affect the biology and ecology of major temperate marine ecosystems
- Compare and contrast the life histories between different types of marine organisms,

including algae, marine angiosperms, invertebrates and vertebrates

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

## Debate Papers

Due: **TBA**

Weighting: **2%**

Submission of a recent (2010+) publication as supporting argument for your group debate

On successful completion you will be able to:

- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the processes that affect the biology and ecology of major temperate marine ecosystems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Identify the role of marine protected areas to marine systems and describe how marine protected areas work in NSW
- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Student Project

Due: **TBA**

Weighting: **20%**

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:

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the processes that affect the biology and ecology of major temperate marine ecosystems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Chemical Ecology Report

Due: **TBA**

Weighting: **12%**

Individually written report of analyses and results from chemical ecology practical classes

On successful completion you will be able to:

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Debate

Due: **TBA**

Weighting: **12%**

Five minute individual oral presentations of a nominated topic in the form of a debate

On successful completion you will be able to:

- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Final Exam

Due: **TBA**

Weighting: **44%**

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:

- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the processes that affect the biology and ecology of major temperate marine ecosystems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Identify the role of marine protected areas to marine systems and describe how marine

protected areas work in NSW

- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## Delivery and Resources

### CLASSES

#### Lectures

- Thursday 12-1pm C6A 131
- Friday 12-1pm C5A 232

#### Practical

- Friday 2-5pm E8A 120/160

### REQUIRED AND RECOMMENDED TEXTS AND/OR MATERIALS

#### Textbook

The textbook for BIOL373 is

- Connell SD & Gillanders BM 2007 *Marine Ecology*. Oxford University Press, 630 pages (ISBN 978-0-19-555302-4).

This book is available at the University bookshop and several copies are held in Open Reserve in the Library. Other recommended readings will be given at the end of lecture summaries and some may be accessible through the library.

### UNIT WEBPAGE AND TECHNOLOGY USED AND REQUIRED

#### BIOL373 Web page

Summaries of lectures, data sets from practicals, instructions for assessment and other juicy resources will be posted throughout the course on the iLearn BIOL373 website. Please check this regularly for any urgent messages (e.g., cancellation of a field trip due to rough seas) – this is our main link with you outside contact hours. You can also use the unit website as a discussion forum to chat with each other regarding aspects of the unit, or to seek help from unit staff for simple questions. If you have larger or difficult questions, please arrange an appointment with one of the unit staff rather than posting your question online. Unit staff will monitor the online discussions daily each weekday. To access the website go to: <https://ilearn.mq.edu.au/login/MQ/>

More information on this system can be found at: [http://www.mq.edu.au/iLearn/student\\_info/](http://www.mq.edu.au/iLearn/student_info/)

#### Marine biology readings Online

Recommended readings are given at the end of each lecture summary and are accessible through library databases or will be made available online. You are not expected to read all of



the recommended readings for each lecture; they are there for extra referencing should you wish to know more about a particular topic. You will also be expected to do your own literature searches through the library for assignments. MQ student's usernames and passwords: All students will have received a Username and Password in the mail after enrolments. Usernames consist of the first letter of your given name, then the first four letters of your surname followed by three random numbers as per notification. Passwords are made up of two random characters followed by your birthday (ddmmyy).

## Unit Schedule

Lecture 1	Thursday	12-1 pm	C6A 131
Lecture 2	Friday	12-1 pm	C5A 232
Practicals	Friday	2-5pm	E8A 120 & E8A 160

Week	Lecture	Practical
1	Introduction Invertebrate life histories	Introduction to Student group project in the Field
2	Rocky Shores I Rocky Shores II	Student group project - Planning & feedback session for project proposal
3	Rocky Shores III Kelp forests	Student group project - Field session 1
4	Algae Soft sediments	Algal diversity & debate planning (introduction, teams, papers)
5	Seagrasses Mangroves & salt marshes	Student group project - Field session 2
6	Foraminifera Deep ocean	Student group project – Data Analysis
		<b>Mid-semester break</b>

7	Fish Behaviour Shark Ecology	No practical
8	Chemical Ecology I Chemical Ecology II	Chemical ecology I
9	Recruitment & Fisheries Aquaculture I	Chemical ecology II
10	Aquaculture II No lecture	Sydney aquarium
11	Fisheries bycatch & discarding	Debates
12	Climate change I Climate change II	Debates
13	Marine protected areas Revision	End of practicals

## 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](http://mq.edu.au/policy/docs/academic_honesty/policy.html)

Assessment Policy <http://mq.edu.au/policy/docs/assessment/policy.html>

Grading Policy <http://mq.edu.au/policy/docs/grading/policy.html>

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

Grievance Management Policy [http://mq.edu.au/policy/docs/grievance\\_management/policy.html](http://mq.edu.au/policy/docs/grievance_management/policy.html)

Disruption to Studies Policy [http://www.mq.edu.au/policy/docs/disruption\\_studies/policy.html](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/](https://students.mq.edu.au/support/student_conduct/)

## 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](http://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](http://ask.mq.edu.au)

## IT Help

For help with University computer systems and technology, visit <http://informatics.mq.edu.au/help/>.

When using the University's IT, you must adhere to the [Acceptable Use Policy](#). The policy applies to all who connect to the MQ network including students.

## Graduate Capabilities

### 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

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Explain the importance of global fisheries and aquaculture and evaluate their current

ecological status

- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Identify the role of marine protected areas to marine systems and describe how marine protected areas work in NSW

## **Assessment tasks**

- Online Quiz
- Student Project Proposal
- Debate Papers
- Student Project
- Debate
- Final Exam

## **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**

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts

## **Assessment tasks**

- Student Project Proposal
- Debate Papers
- Student Project
- Debate
- Final Exam

## 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

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
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- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

### Assessment tasks

- Online Quiz
- Student Project Proposal
- Debate Papers
- Student Project

- Chemical Ecology Report
- Debate
- 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

- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
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### Assessment tasks

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- Debate Papers
- Student Project
- Debate
- Final Exam

## 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

- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Describe how chemical and behavioural processes can mediate interactions between marine organisms, and the applied aspects to this
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
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### Assessment tasks

- Student Project Proposal
- Debate Papers
- Student Project
- Debate
- Final Exam

## 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**

- Develop appropriate experimental designs to test hypotheses
- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Compare and contrast the life histories between different types of marine organisms, including algae, marine angiosperms, invertebrates and vertebrates
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them

## **Assessment tasks**

- Student Project Proposal
- Student Project
- Final Exam

## **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 outcomes**

- Explain the importance of global fisheries and aquaculture and evaluate their current ecological status
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Develop and refine basic skills and knowledge of bibliographic principles associated with designing, writing and formatting primary scientific manuscripts

## **Assessment tasks**

- Student Project Proposal



- Debate Papers
- Student Project
- Debate
- 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

- Comply to safety procedures, risk assessments and logistic constraints involved in marine laboratory and fieldwork
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts
- Identify the role of marine protected areas to marine systems and describe how marine protected areas work in NSW

### Assessment tasks

- Online Quiz
- Student Project Proposal
- Student Project
- Chemical Ecology Report
- Final Exam

## 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

- Apply qualitative and quantitative scientific methods and techniques to explore scientific questions related to temperate marine systems
- Explain the role of aquaculture in Australia and how this differs to aquaculture in other countries
- Identify the mechanisms by which climate change will modify marine systems and describe the anticipated impacts
- Outline the special needs of protected and vulnerable aquatic organisms and the costs and benefits to protecting them
- Identify the role of marine protected areas to marine systems and describe how marine protected areas work in NSW

## Assessment tasks

- Online Quiz
- Student Project Proposal
- Student Project
- Chemical Ecology Report
- Final Exam