UNSW Course Outline

MSCI5005 Topics in Marine Biology and Ecology - 2024

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General Course Information

Course Code : MSCI5005
Year : 2024
Term : Term 1
Teaching Period : T1
Is a multi-term course? : No
Faculty : Faculty of Science
Academic Unit : School of Biological, Earth and Environmental Sciences
Delivery Mode : In Person
Delivery Format : Standard
Delivery Location : Kensington
Campus : Sydney
Study Level : Postgraduate
Units of Credit : 6

Useful Links

Handbook Class Timetable

Course Details & Outcomes

Course Description

Oceans occupy 75% of the planet's surface and have the capacity to moderate our climate and supply our food, water and oxygen. The East Australian Current also has a substantial and unappreciated effect on our lives. The dominant players and processes in pelagic marine

ecosystems include fine-scale ocean physics, to nutrients, phytoplankton, zooplankton, fish and sharks. We consider human impacts and possible solutions through engineering of pelagic ecosystems such as bottom-up ecosystem regulation through nutrient supply, or top-down regulation of ecosystems by sharks and other predators; removal of mid-level planktivores, re-stocking of fish; ocean fertilization; carbon sequestration; and artificial reefs.

Students will study estuarine ecosystems, including the effects of catchments and nutrients on hydrography and estuarine habitats, using a spreadsheet version of the world-renowned software Ecopath. The systematics and ecology of fish, and to some degree sharks and rays will be a feature of the course including the impacts of fisheries in removing the dominant ecosystem predators thus inducing an ecosystem cascade. A reverse ecosystem cascade sometimes occurs in estuaries with excessive nutrients (eutrophication).

Overview of course. This course component is offered to students in the M MarSciMgt program (8271). It mostly involves taking the Ocean to Estuarine Ecosystems BIOS3081 lectures, and completing the field trip to Smiths Lake. There are 3 lectures and one tutorial per week. The lectures immediately precede the tute or lab, and material is reinforced with a simple online quiz. Attendance at the BIOS3081 labs in Weeks 1-5 is not compulsory, although it is encouraged. There is a 4-day field trip during Week 6.

Assumed knowledge: BIOS2031 and BEES2041

Note: The course will include an intensive 4 day field trip to Smiths Lake in Week 6. This will involve personal expense to students for transportation, food and accommodation.

Course Aims

The course aims to emphasise the practical application of theory in environmental marine science.

New fisheries and oceanographic technologies are discussed during lectures. Particular environmental concerns and examples from off Sydney's coast are given, along with international examples. The laboratories and field work are arranged to give students experience in the design and sampling of field research, and in the analysis and write-up of a report. The field trips are also designed to exhibit a large variety of field equipment. Skills in scientific writing are further developed with the essay, field-study report and laboratory reports. Computing skills are expected and will be enhanced during this course.

Relationship to Other Courses

MSCI5005 (Topics in Marine Biology and Ecology) is one of the three core course of the Masters in Marine Science & Management Program 8271, held in T1. The course is co-taught with BIOS3081 Ocean to Estuarine Ecosystems with significant differences in the assessments (e.g. includes an essay, but not the lab material and lab exam). It includeds the field trip to Smiths Lake. There are 3 lectures and one tutorial per week.

Two lectures are on **TUESDAY 2-4 pm in E26-Lab04 and a 1 hour tutorial 4-5 pm (reinforced by a simple online quiz); and third lecture FRIDAY 9-10 am in E26-Lab04** (followed by a 2 h lab, not compulsory for MSCI5005). All presentations are recorded on Moodle Collaborate. Students may attend the BIOS3081 laboratories but these are not compulsory for MSCI5005. Labs are in E26-Lab04 Friday 10 to 12 noon (and lab guide pdf is on Moodle, and sold in the bookshop, but is not compulsory). The essay is on age and growth of any marine animal.

Lectures are in person and/or online via the Moodle Collaborate links for BIOS3081.

There is an expectation of assumed knowledge in basic statistics (BIOS2041), marine science (MSCI1001), and preferably Invertebrate Biology (BIOS2061). However with additional reading, many students (especially from overseas) do well in this course through readings required for the essay (on the age and growth of any marine animal).

Course Learning Outcomes

Course Learning Outcomes
CLO1 : Evaluate the oceanographic drivers of plankton and fisheries, using an ecosystem perspective.
CLO2 : Describe the diversity of phytoplankton, zooplankton, fish and sharks, and their taxonomic relationships.
CLO3 : Collect abundance and biomass data of an estuarine ecosystem, from producers to consumers using various field equipment. Utilise the laboratory skills to describe the species composition.
CLO4 : Analyse the field trip data with the Ecopath software package, to reveal why the ecosystem at Smiths Lake is not in equilibrium, and why.
CLO5 : Critically review scientific literature on age and growth of fish of other marine fauna, using online databases to search peer-reviewed journals.
CLO6 : Communicate scientific information using precise language for a specialist audience in both written and oral format.

Course Learning Outcomes	Assessment Item
CLO1 : Evaluate the oceanographic drivers of plankton and fisheries, using an ecosystem perspective.	• Quizzes • Field Trip Report • Final Test
CLO2 : Describe the diversity of phytoplankton, zooplankton, fish and sharks, and their taxonomic relationships.	• Essay • Quizzes • Field Trip Report • Final Test
CLO3 : Collect abundance and biomass data of an estuarine ecosystem, from producers to consumers using various field equipment. Utilise the laboratory skills to describe the species composition.	• Quizzes • Field Trip Report • Final Test
CLO4 : Analyse the field trip data with the Ecopath software package, to reveal why the ecosystem at Smiths Lake is not in equilibrium, and why.	• Field Trip Report • Final Test
CLO5 : Critically review scientific literature on age and growth of fish of other marine fauna, using online databases to search peer-reviewed journals.	• Essay • Field Trip Report • Final Test
CLO6 : Communicate scientific information using precise language for a specialist audience in both written and oral format.	• Essay • Final Test

Learning and Teaching Technologies

Moodle - Learning Management System | Blackboard Collaborate | Microsoft Teams | Echo 360

Learning and Teaching in this course

The aim of this course is to integrate understanding from earlier courses in biology, ecology, and statistics into a comprehensive knowledge of modern marine science. This is achieved through exploring the structure and function of marine ecosystems, entailing the transfer of carbon from phytoplankton to fisheries. The initial laboratory classes underpin the 4 day field trip to Smiths Lake field station, to apply various sampling methods of plankton, fish, benthos. The course examines the counter-intuitive consequences of disrupted ecosystems, and how these can be restored.

At the end of the course you can expect:

1. To have a broad appreciation of environmental science and ecosystem science - from physics to fishery - and the principle of mass-balance,
2. To appreciate and enjoy the diversity of phytoplankton, zooplankton and fish, and have a basic knowledge of their taxonomy,
3. To have experience with a variety of field equipment, and the analysis of the data collected,

4. Experience with scientific writing skills, with critical reading of some scientific literature, and with computers, software and analysis, and,
5. Experience in estuarine and coastal ecology, oceanography and climate, and management.

This course is based around the 4 day field trip to Smiths Lake Field camp during Week 5/6 (an alternative assignment is provided under exceptional circumstances). To achieve the 5 learning outcomes outlined above we will link lectures, tutorials and labs to give you the information you need. The laboratories will directly complement the lectures, to understand the confines and regulations that biologists face when working in fisheries and to provide practical experience in a variety of techniques used by people currently working in the field should they choose that career path.

Lecture notes provided on Moodle are a guide to the course with additional supplemental material will be provided during the lecture and may be updated on Moodle.

The textbook and recommended readings provide sources of information and examples. The practical classes, field trip and the textbook will also assist you.

The final exam will assess components of the course to ensure all 5 learning outcomes are understood.

Outside reading in the course is essential – especially recent relevant marine science issues.

The course is designed to make you think independently, as you will be required to do out in the workforce and in research.

Marine Science takes a wide range of skills, from recognising a yellow-fin bream or making a lucid case about climate change, to chatting with the public and the fishing industry, to constructively dealing with bureaucrats. Therefore, the Smiths Lake report and many of the labs are open ended. Some of the assignments may frustratingly seem to be open ended. This is because we want to hear what you actually think and to be constructively critical (and to teach us in a way), rather than give a pre-prepared answer.

Additional Course Information

Additional Information.

MSCI5005 provides valuable fieldwork and practical experience and thereby complements the capstone course MSCI6681, and the other two core courses MSCI5004 Oceanographic

Processes (T2) and MSCI9001 Conservation in Aquatic Ecosystems (T3).

Don’t be confused by separate assessments for undergrads in BIOS3081 (e.g. the lab exam)

You may wish to attend the labs, but not compulsory. See lab guide for BIOS3081 and MSCI5005 for expectations, courtesy and plagiarism.

Assessments

Assessment Structure

Assessment Item	Weight	Relevant Dates
Quizzes Assessment Format: Individual	10%	
Essay Assessment Format: Individual	30%	
Field Trip Report Assessment Format: Individual	40%	
Final Test Assessment Format: Individual	20%	

Assessment Details

Quizzes

Assessment Overview

The on-line quiz occurs each week before the field trip, to reinforce the tutorial and laboratory outcomes, and the final seminars at Smiths Lake field camp (Weeks 1-5, 7).

The online quizzes are composed of 10 multiple choice questions. The quizzes are worth 2% each, providing a total mark from the best 5 marks. Quizzes are typically open for 3 days. You will receive feedback by opportunity to review marked quiz attempts immediately after submission.

Course Learning Outcomes

- CLO1 : Evaluate the oceanographic drivers of plankton and fisheries, using an ecosystem perspective.
- CLO2 : Describe the diversity of phytoplankton, zooplankton, fish and sharks, and their taxonomic relationships.
- CLO3 : Collect abundance and biomass data of an estuarine ecosystem, from producers to consumers using various field equipment. Utilise the laboratory skills to describe the species composition.

Essay

Assessment Overview

This assignment involves the completion of two tasks, an essay and a seminar presentation.

Essay (25% weighting, approximately 4000 words): In general (and depending on your interests and background), the essay is a comparison of the age and growth of 2 or 3 species of fish or marine invertebrates.

Topics should include the nature and function of scales, otoliths and other bones in fish or hard parts in marine invertebrates, the importance and application of age and growth determination in fisheries, mathematical growth models, larval ages and fisheries oceanography, examples of year class strength variation and recruitment, the effect of temperature and food abundance, and microchemistry. The review should emphasise your background and future interests (e.g. tropical, temperate, polar, aquaculture, freshwater, larval, adult, fish, squid, gastropod, bivalve, sea urchin etc.).

The submission is typically due around Weeks 4-5 . Feedback is provided within 10 working days of submission.

Seminar (5% weighting): You will present a 5-10-minute seminar based on your essay at the end of Term. The presentation should include a PowerPoint presentation. Feedback will be provided either immediately or within 10 working days.

Course Learning Outcomes

- CLO2 : Describe the diversity of phytoplankton, zooplankton, fish and sharks, and their taxonomic relationships.
- CLO5 : Critically review scientific literature on age and growth of fish of other marine fauna, using online databases to search peer-reviewed journals.
- CLO6 : Communicate scientific information using precise language for a specialist audience in both written and oral format.

Field Trip Report

Assessment Overview

You will be expected to complete two related components; 1) a short paper on the field technique to quantify the abundance and biomass of various ecotrophic groups of an estuary (approximately 500 words, worth 10%) and 2) a substantial report on the ecosystem of Smiths Lake, critiquing the methods and why the ecosystem is not balanced (approximately 4000 words,

worth 30%)

The first component is due in Week 5 prior to departing for Smiths Lake, and the second is due in the Exam Period after the tutorials and discussion.

Both assessments will be supported by tutorials and by feedback on the field trip seminar.

Course Learning Outcomes

- CLO1 : Evaluate the oceanographic drivers of plankton and fisheries, using an ecosystem perspective.
- CLO2 : Describe the diversity of phytoplankton, zooplankton, fish and sharks, and their taxonomic relationships.
- CLO3 : Collect abundance and biomass data of an estuarine ecosystem, from producers to consumers using various field equipment. Utilise the laboratory skills to describe the species composition.
- CLO4 : Analyse the field trip data with the Ecopath software package, to reveal why the ecosystem at Smiths Lake is not in equilibrium, and why.
- CLO5 : Critically review scientific literature on age and growth of fish of other marine fauna, using online databases to search peer-reviewed journals.

Final Test

Assessment Overview

The Final Test is designed to assess your knowledge of the topics delivered across the term. It is typically one hour in duration and is scheduled in Week 10, during class.

Feedback is available through inquiry with the course convenor.

Course Learning Outcomes

- CLO1 : Evaluate the oceanographic drivers of plankton and fisheries, using an ecosystem perspective.
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- CLO3 : Collect abundance and biomass data of an estuarine ecosystem, from producers to consumers using various field equipment. Utilise the laboratory skills to describe the species composition.
- CLO4 : Analyse the field trip data with the Ecopath software package, to reveal why the ecosystem at Smiths Lake is not in equilibrium, and why.
- CLO5 : Critically review scientific literature on age and growth of fish of other marine fauna, using online databases to search peer-reviewed journals.
- CLO6 : Communicate scientific information using precise language for a specialist audience in both written and oral format.

General Assessment Information

Essay on age and growth of any marine animal (4,000 words) plus a seminar in Week 9 (5 minutes)

Weekly "quiz" in Weeks 1-5, which are merely review the major points of the week

Field trip report submitted in two sections on a) methods; and b) Smiths Lake Field reports (4,000 words)

Final test in Week 10

Grading Basis

Standard

Requirements to pass course

Achieve a composite mark of at least 50 out of 100.

Course Schedule

Attendance Requirements

Students are strongly encouraged to attend all classes and review lecture recordings.

General Schedule Information

See the BIOS3081/MSCI5005 lab guide for details.

We meet in the "fish lab" Lab-04 Tuesday afternoons 2-5 pm (two lectures followed by tutorial); Friday mornings (one lecture followed by 2 hour lab). The lectures are recorded; the tutorial can be done remotely. However, the labs in Weeks1-5 and the field trip to Smiths Lake are not recorded. The course is dominated by the Smiths Lake field trip in Week 6 to examine marine ecoystems - from the lectures and labs in Weeks 1-5; and then seminars and Sydney Aquarium field trip in Weeks 7-10.

Course Resources

Prescribed Resources

The text book is:

- Connell, S and Gillanders (eds). 2007. Marine Ecology. Oxford University Press [library, bookshop]

**** After 2022 these references are supplied on-line from the Moodle page (see "Leganto")**

Alternatively:

- Hammond, L.S. and R.N. Synnot (eds.). 1994 **Marine Biology**. Now out of print but limited copies are available in UNSW bookshop. Relevant chapters will be referred to during lectures.

(especially see the chapter on fisheries by King).

- Underwood, A.J. and MG Chapman. 1995. Coastal marine ecology of temperate Australia. UNSW Press. (copies of the relevant chapters may be borrowed on request).
- Suthers IM, D Rissik and A.J. Richardson 2019. "Plankton for Natural Resource Managers: a guide to the ecology and observation" CSIRO Publishing.

Recommended Resources

The former text for the complementary course Marine & Aquatic Ecology (BIOS3091, Session II) was "**Biology of Marine Plants**" edited by Clayton and King (1990 – now out of print also!) which has two chapters that are crucial to the early part of this course (of which the library has copies, and these two chapters will be on Open Reserve):

- "Oceanography of the Australasian region" by Jeffrey, Rochford and Cresswell pp. 243-265, and,
- "Phytoplankton ecology of Australasian waters" by Jeffrey and Hallegraeff, pp. 310-348.
- Any Invertebrate text (e.g. Barnes, R.D. Invertebrate Zoology, publ. Saunders Co. Philadelphia, or Barnes, Calow & Olive The Invertebrates: a new synthesis)
- Hammond, L.S. and R.N. Synnot (eds.). 1994 Marine Biology. Now out of print but limited copies are available in UNSW bookshop.
- M. G. King (2007) Fisheries Biology: Assessment and Management 2nd Edition. Blackwell ISBN 978-1-4051-5831-2
- Malcolm Haddon (2001) Modelling and Quantitative Methods in Fisheries Chapman and Hall/ CRC Press ISBN 1-58488-177-1
- Jennings M et al. (2003) Marine Fisheries Ecology Blackwell ISBN: 0-632-05098-5
- Kailola, P.J., Williams, M.J., Stewart, P.C., Reichelt, R.E., McNee, A., Grieve, C. (1993). Australian Fisheries Resources. Bureau of Resource Sciences Canberra, Australia (library has copies in the large book section, or in open reserve).
- Lagler, K.F. et al. 1977. Ichthyology. 2nd ed John Wiley and Sons (classic fish text)
- Nelson, J.S. 1976. Fishes of the world. Wiley and Sons (an excellent taxonomic text)
- Barnes RSK and R.N Hughes. An Introduction to Marine Ecology (second Edn, Blackwell Scientific - of which the library has copies).
- Hutchins, B. and R. Swainston. 1986. Sea fishes of southern Australia. Swainston Publishing, Perth (an excellent, cheap guide to local fish - this course owns some copies for borrowing by

students, and is necessary for the Aquarium lab.)
- Parsons, T.R. et al. 1984. Biological oceanographic processes. 3rd ed. Pergamon Press. (excellent biological oceanography)
- Valiela, I. 1984. Marine ecological processes. Springer-Verlag.
- Kingsford, M.J. and C.N. Battershill. 1998. Studying temperate marine environments. UNSW Press. (excellent for field trip references)

Websites

- http://oceancurrent.imos.org.au/

IMOS web link to ocean currents now

- http://www.dpi.nsw.gov.au/fisheries

A wealth of info on NSW fisheries

- http://www.underwatertimes.com/

Hot marine issues

- http://www.dpi.nsw.gov.au/aboutus/about/employment

Getting a job at DPI

- http://www.afma.gov.au/

Australian Fisheries Management Authority

- http://www.affa.gov.au/

Australian Dept. of Agriculture, Fisheries and Forestry

http://www.cmar.csiro.au/

CSIRO Marine and Atmospheric Research

Additional Costs

Field trip costs approximately $220 for bus and food an accommodation at Smiths Lake field camp

Course Evaluation and Development

The course evaluations are crucial to improve the course. Past suggestions concern keeping the Sydney Aquarium field trip; reducing course content; provision of lecture notes as a pdf; and

improved lecture recordings.

Staff Details

Position	Name	Email	Location	Phone	Availability	Equitable Learning Services Contact	Primary Contact
Convenor	Iain Suthers		4113, BioSciences E26	93852065	Monday to Friday, 9 to 5	No	Yes

Other Useful Information

Academic Information

Upon your enrolment at UNSW, you share responsibility with us for maintaining a safe, harmonious and tolerant University environment.

You are required to:

- Comply with the University's conditions of enrolment.
- Act responsibly, ethically, safely and with integrity.
- Observe standards of equity and respect in dealing with every member of the UNSW community.
- Engage in lawful behaviour.
- Use and care for University resources in a responsible and appropriate manner.
- Maintain the University's reputation and good standing.

For more information, visit the UNSW Student Code of Conduct Website.

Academic Honesty and Plagarism

Referencing is a way of acknowledging the sources of information that you use to research your assignments. You need to provide a reference whenever you draw on someone else's words, ideas or research. Not referencing other people's work can constitute plagiarism.
Further information about referencing styles can be located at https://student.unsw.edu.au/referencing

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

detected in your work.

Further information about academic integrity, plagiarism and the use of AI in assessments can be located at:

- The Current Students site,
- The ELISE training site, and
- The Use of AI for assessments site.

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

Submission of Assessment Tasks

Penalty for Late Submissions

UNSW has a standard late submission penalty of:

- 5% per day,
- for all assessments where a penalty applies,
- capped at five days (120 hours) from the assessment deadline, after which a student cannot submit an assessment, and
- no permitted variation.

Any variations to the above will be explicitly stated in the Course Outline for a given course or assessment task.

Students are expected to manage their time to meet deadlines and to request extensions as early as possible before the deadline.

Special Consideration

If circumstances prevent you from attending/completing an assessment task, you must officially apply for special consideration, usually within 3 days of the sitting date/due date. You can apply by logging onto myUNSW and following the link in the My Student Profile Tab. Medical documentation or other documentation explaining your absence must be submitted with your application. Once your application has been assessed, you will be contacted via your student email address to be advised of the official outcome and any actions that need to be taken from there. For more information about special consideration, please visit: https://student.unsw.edu.au/special-consideration

Important note: UNSW has a "fit to sit/submit" rule, which means that if you sit an exam or submit a piece of assessment, you are declaring yourself fit to do so and cannot later apply for

Special Consideration. This is to ensure that if you feel unwell or are faced with significant circumstances beyond your control that affect your ability to study, you do not sit an examination or submit an assessment that does not reflect your best performance. Instead, you should apply for Special Consideration as soon as you realise you are not well enough or are otherwise unable to sit or submit an assessment.

Faculty-specific Information

Additional support for students

- The Current Students Gateway
- Student Support
- Academic Skills and Support
- Student Wellbeing, Health and Safety
- Equitable Learning Services
- UNSW IT Service Centre
- Science EDI Student Initiatives, Offerings and Guidelines