



## 1. Staff

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Position	Name	Email & contact details	Consultation times and locations
Course Convenor	Iain Suthers	9385 2065 (UNSW) <a href="mailto:I.Suthers@unsw.edu.au">I.Suthers@unsw.edu.au</a>	Use email for personal or administrative questions, or consult immediately following lectures or lab.
Tutors & demonstrators	Charlie Hinchliffe Matt Holland, or Hayden Schilling		By appointment
Technical & laboratory staff	Suzy Evans	<a href="mailto:s.evans@unsw.edu.au">s.evans@unsw.edu.au</a>	By appointment
Other support staff			

## 2. Course information

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Units of credit: 6UOC

Pre-requisite(s): None

Assumed knowledge: BIOS2031 - Biology of Invertebrates; BEES2041 – Data Analysis for Life and Earth Sciences; Biometry

Teaching times and locations:

<http://www.timetable.unsw.edu.au/2020/BIOS3081>

<http://www.timetable.unsw.edu.au/2020/BIOS3681>

Component				
Lecture 1	1	2 pm	Monday	E26-Lab04
Lecture 2	1	9 am	Friday	E26-Lab04
Tutorial/Lecture3	2	3-5 pm	Monday	E26-Lab04
Laboratory 1	2	10-12 pm	Friday	E26-Lab04
Other activities, e.g., field trips	30 total		<b>13-17 March 2020</b>	Smiths Lake Field camp
<b>TOTAL</b>	70			

Note: A compulsory field trip will be held during week 5. Personal expenses will be incurred.

## 2.1 Course summary

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. OtEE outlines the dominant players and processes in pelagic marine ecosystems, from fine-scale ocean physics, to nutrients, phytoplankton, zooplankton, fish and sharks. We 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 in particular, and to some degree sharks and rays will be a feature of the course. The 4-day field trip to Smiths Lake replaces many of the labs later in term. Other topics may include 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.

## 2.2 Course aims

Ocean to Estuarine Ecosystems is designed for senior undergraduates to provide broad experience in the science and management of coastal waters, estuaries and the organisms that live in the water (plankton, fish). After completing this course you should have the confidence and knowledge to commence your own research project in marine science (such as honours) or to commence employment with a water quality/fisheries authority.

The course emphasises 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 you 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 and statistics are further developed with the field-study report. Computing skills are expected and will be enhanced during this course.

## 2.3 Course learning outcomes

At the end of the course you can expect:

1. To have a broad appreciation of biological oceanography and its application to environmental research and fisheries,
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.

## **3. Strategies and approaches to learning**

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### **3.1 Learning and teaching activities**

This course is based around the 4 day field trip during week 5 (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 text book and recommended readings provide sources of information and examples. The practical classes, field trip and the text book 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 for 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.

### **3.2 Expectations of students**

It is expected that you attend all lectures and labs/tutorials – the text book and partial lecture notes from Moodle are not sufficient. The laboratories and the field trip are essential. Attendance will be recorded at laboratories and at least 80% is expected.

## 4. Course schedule and structure

Lectures in yellow; tutorials (T1-T7); labs in blue;

Week	Lecture Monday– 2 pm E26-Lab04	Tutorials/Lecture – Monday 3-5 pm, E26-Lab04	Lecture Friday – 9 am E26-Lab04	LABORATORY – Friday 10-12 pm E26-Lab04	Assignment due dates,
<b>Week 1</b> 17-21 Feb	<b>L1) Intro lecture</b> <b>Oceanography-1</b>	T1, <b>Tank demo</b> with seawater Laptops: data, histograms; Quiz-1 <b>L2) Oceanography-2</b>	<b>L3) Phytoplankton-1,</b> <b>diversity</b>	<b>Lab-1,</b> salinity, temperature, density; Sugar, isopycnal plot salt fingers;	Quiz due end of each week (15%)
<b>Week 2</b> 24-28 Feb	<b>L4) Phytoplankton-</b> <b>2</b>	T2, Phytoplankton; 4 scopes; XBT, salinity meters, Quiz-2 <b>L5) Ocean dynamics-1, IMOS</b>	<b>L6) Fish-1, diversity</b>	<b>Lab-2,</b> Fish diversity Orders, families and some genera and species	
<b>Week 3</b> 2-6 March	<b>L7) Zooplankton-1</b>	T3, Multivariate stats Quiz-3 stats and zooplankton <b>L8) Zooplankton-2</b>	<b>L9) Fish-2, reproduction</b>	<b>Lab-3,</b> a) Fish dissection b) mulloway otoliths c) tree rings?	
<b>Week 4</b> 9-13 Mar	<b>L10) Ecosystems-1</b>	T4, Ecopath tute, Quiz-4 <b>L11) Ocean dynamics-2, IMOS</b> Smiths Lake Introduction	No class Travel to Smiths Lake		
<b>Week 5</b> 16-20 Mar	<b>Friday to Tuesday</b> <b>Smiths Lake field trip</b>	<b>Smiths Lake field trip</b> <b>Friday to Tuesday, 13-17 March 2020</b>	No lecture (because field-trip week)	No Lab (but start field trip analysis?)	
<b>Week 6</b> 23-27 Mar	<b>L12) Ecosystems-2</b>	T5, Field trip with demonstrators, <b>L13) Shark-1 diversity.</b> No Q5	<b>L14) Shark-2</b>	<b>Lab-4</b> Shark-lab	
<b>Week 7</b> 30Mar-3Ap	<b>L15) Fisheries-1</b> <b>Age &amp; growth</b>	T6, Smiths Lake presentations, Q6, <b>L16) Fisheries-2, Yield+SydAqu intro</b>	<b>Lab-5</b> Sydney Aquarium field trip	<b>Sydney Aquarium field trip</b>	
<b>Week 8</b> 6-10 April	<b>L17) Engineering</b> <b>ecosystems-1</b>	T7 Age & Growth (Lab3), Quiz-7 <b>L18) Engineering ecosystems-2</b>	Good Friday holiday		Field trip report (30%) Wed. 12 noon
<b>Week 9</b> 13-17 April	Easter Monday holiday		<b>Lab exam</b>	<b>Lab exam</b>	Lab exam (15%)
<b>Week 10</b> 20-24 April	<b>L19) Urban fisheries</b> <b>ecology-1</b>	T8 Special topics, Discussion <b>L20) Urban fisheries ecology-2</b>	Video presentations by BIOS3681 on Ecopath	a) Seminars by MSc students b) Review past papers	Video presentation for BIOS3681 (30%)
<b>Week 11</b> Tue28 April	<b>L21) Physics to</b> <b>fisheries-1</b>	T9 Special topics, Discussion <b>L22) Physics to fisheries-2</b>	No scheduled classes (kept in reserve)	No scheduled classes (kept in reserve)	

## 5. Assessment

### 5.1 Assessment tasks

Task	Knowledge & abilities assessed	Assessment Criteria	% of total mark	Date of		Feedback		
				Release	Submission	WHO	WHEN	HOW
Moodle quizzes,	Detailed knowledge of some classic fisheries and introduction/application of multivariate ecological statistics	Correct answers to the questions that demonstrates you understand the processes	15	Week 1	On-line after tutorials (T1-T7), Fridays	Iain Suthers	Fridays	Moodle And lab
Field Trip report	Team work, independent scientific skills; Scientific writing, statistics; Experimental design	Data and graph presentation; Clear understanding of group activity Integrated some references ?	30	Week 5	Week 8, Wednesday 4pm; Student office, G27, Assignment box	Iain Suthers	Week 8	Moodle And lab
Laboratory exam	Broad knowledge of the laboratories, especially fish identification and those labs that were unassessed	Correct answers to each 2 minute question, 50 chairs, taking 100 min.	15	Week 8	Immediately after the lab exam	Iain Suthers	1 week after session	Moodle
<b>BIOS3681</b> , on-line video	"Carbon in = Carbon out: balancing food webs with Ecopath"	Abstract and notes; Key graphs on Ecopath Video content and style	<b>OR</b> 30	Week 1	Week 10	Iain Suthers	1 week after session	Moodle
Final Exam			40	Examination period		Iain		email
Summary of Assessment		Field Trip report 30% Moodle quizzes 15% Lab exam 15%; Final Exam 40%						

## Further information

UNSW grading system: [student.unsw.edu.au/grades](http://student.unsw.edu.au/grades)

UNSW assessment policy: [student.unsw.edu.au/assessment](http://student.unsw.edu.au/assessment)

## 5.2 Assessment criteria and standards

See lab manual for full details of each assessment

**Practical Reports** - Think and be original - do not regurgitate the lab guide. Much of what we give credit for is realised post hoc as "common sense" or "obvious". Laboratories with no required report will be assessed in the laboratory exam.

## 5.3 Submission of assessment tasks

All written work backed up on memory stick (in case it becomes lost in the system). All assignments should be submitted via Moodle (and the turn-it-in link). As a last resort, email to [I.Suthers@unsw.edu.au](mailto:I.Suthers@unsw.edu.au) Cover sheet and policies found at:

<http://www.bees.unsw.edu.au/bsb-student-office>

**Late assignments** - Late reports/essays may be tolerated, if supported by a medical certificate, or a letter that was approved by Iain Suthers **before the due date**. Any further delays will incur a loss of 10% per day.

If you are sick on the day of a laboratory, you may either hand in a medical certificate with the cover sheet (and receive an average of your labs) or hand it in later with medical certificate and using your colleagues' data.

## 6. Academic integrity, referencing and plagiarism

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

Further information about referencing styles can be located at [student.unsw.edu.au/referencing](http://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.<sup>1</sup> At UNSW, this means that your work must be your own, and others' ideas should be appropriately acknowledged. If you don't follow these rules, plagiarism may be detected in your work.

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

- The *Current Students* site [student.unsw.edu.au/plagiarism](http://student.unsw.edu.au/plagiarism), and
- The *ELISE* training site [subjectguides.library.unsw.edu.au/elise](http://subjectguides.library.unsw.edu.au/elise)

The *Conduct and Integrity Unit* provides further resources to assist you to understand your conduct obligations as a student: [student.unsw.edu.au/conduct](http://student.unsw.edu.au/conduct).

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

## 7. Readings and resources

<b>Text Books</b>	<ul style="list-style-type: none"> <li>• Connell, S and Gillanders (eds). 2007. Marine Ecology. Oxford University Press [library, bookshop]</li> <li>• Suthers IM, AJ. Richardson, D Rissik. 2019, Plankton: A Guide to Their Ecology and Monitoring for Water Quality. CSIRO Publishing. 2<sup>nd</sup> edition</li> </ul>
<b>Course Manual</b>	Course manual will be available to purchase from the UNSW Bookshop, it will also be posted on the Moodle elearning website
<b>Required Readings</b>	<p>Connell SD and BM Gillanders. 2007. Marine Ecology. Oxford University Press, pp 630</p> <p>And especially the chapters:</p> <p style="padding-left: 40px;">Suthers, IM and A. Waite. 2007. Ecological Oceanography, Chapter 9 in [eds Connell &amp; Gillanders], Marine Ecology. Oxford University Press, pp 199-226</p> <p style="padding-left: 40px;">Waite, A. and IM Suthers. 2007. Open water: plankton ecology. Chapter 12 in [eds Connell &amp; Gillanders], Marine Ecology. Oxford University Press, pp 281-315</p> <p><b>"Biology of Marine Plants"</b> edited by Clayton and King (1990) –has two chapters that are important to the early part of this course (of which the library has copies, and these two chapters will be on Open Reserve):</p> <ul style="list-style-type: none"> <li>• "Oceanography of the Australasian region" by Jeffrey, Rochford and Cresswell pp. 243-265</li> <li>• "Phytoplankton ecology of Australasian waters" by Jeffrey and Hallegraeff, pp. 310-348.</li> </ul>
<b>Additional Readings</b>	<p><b>The following books are suggested as good reference;</b></p> <ul style="list-style-type: none"> <li>• <u>Any Invertebrate text</u> (e.g. Barnes, R.D. Invertebrate Zoology, publ. Saunders Co. Philadelphia, or Barnes, Calow &amp; Olive The Invertebrates: a new synthesis)</li> <li>• Hammond, L.S. and R.N. Synnot (eds.). 1994 Marine Biology. Now out of print but limited copies are available in UNSW bookshop.</li> <li>• 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).</li> <li>• Nelson, J.S. 1976. Fishes of the world. Wiley and Sons (an excellent taxonomic text)</li> <li>• 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.)</li> <li>• Kingsford, M.J. and C.N. Battershill. 1998. Studying temperate marine environments. UNSW Press. (excellent for field trip references)</li> </ul>
	<p>The UNSW Library Resource Database  <a href="https://primoa.library.unsw.edu.au/primo-explore/dbsearch?vid=UNSW">https://primoa.library.unsw.edu.au/primo-explore/dbsearch?vid=UNSW</a></p>

<b>Recommended Internet Sites</b>	Or <a href="#">Aquatic sciences &amp; fisheries abstracts</a> (CSA)
<b>Societies</b>	Australian Marine Science Association, <a href="http://www.amsa.asn.au/">http://www.amsa.asn.au/</a> Australian Society for Fish Biology, <a href="http://asfb.org.au/">http://asfb.org.au/</a>
<b>Computer Laboratories or Study Spaces</b>	Computer facilities are available for BEES students on the ground floor. See the BEES student office for access.

## 8. Administrative matters

<b>School information</b>	School website: <a href="http://www.bees.unsw.edu.au/">http://www.bees.unsw.edu.au/</a> School office – The Biosciences Student Office is where to go for administrative matters relating to BEES courses. <a href="mailto:BEESinfo@unsw.edu.au">BEESinfo@unsw.edu.au</a>
<b>Occupational Health and Safety</b>	In BIOS3081/3681 laboratory in <b>E26-Lab04</b> , it is compulsory to: <ul style="list-style-type: none"> <li>• Wear a laboratory coat,</li> <li>• Wear shoes that are strapped to your foot, and no bare toes,</li> <li>• Tie back any long hair.</li> </ul> <p>These safety regulations will now be enforced for laboratories 1,2, 4, 5 and the Laboratory Exam. Anyone who does not comply will not be allowed to attend the laboratory (otherwise you could sue UNSW).</p> <p>Information on relevant Occupational Health and Safety policies and can be found on the following website: <a href="http://www.bees.unsw.edu.au/health-and-safety">http://www.bees.unsw.edu.au/health-and-safety</a></p> <p>UNSW OHS Home page: <a href="http://safety.unsw.edu.au/">http://safety.unsw.edu.au/</a></p>
<b>Equity and Diversity</b>	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 Convenor prior to, or at the commencement of, their course, or with the Equity Officer (Disability) in the Equity and Diversity Unit (9385 4734 or <a href="http://www.studentequity.unsw.edu.au/">http://www.studentequity.unsw.edu.au/</a> ).
<b>Student complaint procedure</b>	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.
	In all cases you should first try to resolve any issues with the course convenor. If this is unsatisfactory, you should contact the School Student Ethics Officer (A/Prof Stephen Bonser, <a href="mailto:s.bonser@unsw.edu.au">s.bonser@unsw.edu.au</a> ) or the Deputy Head of School (A/Prof Scott Mooney <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> ) 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 <a href="https://student.unsw.edu.au/complaints">https://student.unsw.edu.au/complaints</a> ).

	School contact	Faculty Contact	University contact
	Dr S Mooney Deputy Head of School (Undergraduate Programs) <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> Tel: 9385 8063	Dr Chris Tisdell Associate Dean (Education) <a href="mailto:cct@unsw.edu.au">cct@unsw.edu.au</a> Tel: 9385 6792  or Dr S Mooney Associate Dean (Undergraduate Programs) <a href="mailto:s.mooney@unsw.edu.au">s.mooney@unsw.edu.au</a> Tel: 9385 8063	Student Administration in the Office of the Pro- ViceChancellor (Students). <a href="mailto:clare.jones@unsw.edu.au">clare.jones@unsw.edu.au</a> Tel: 9385 3087  University Counselling and Psychological Services3 Tel: 9385 5418 <a href="mailto:counselling@unsw.edu.au">counselling@unsw.edu.au</a>

## 9. Additional support for students

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- The *Current Students* Gateway: [student.unsw.edu.au](http://student.unsw.edu.au)
- Academic Skills and Support: [student.unsw.edu.au/skills](http://student.unsw.edu.au/skills)
- Student Wellbeing, Health and Safety: [student.unsw.edu.au/wellbeing](http://student.unsw.edu.au/wellbeing)
- Disability Support Services: [student.unsw.edu.au/disability](http://student.unsw.edu.au/disability)
- UNSW IT Service Centre: [www.it.unsw.edu.au/students](http://www.it.unsw.edu.au/students)

## 10. Other notes on the course

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**Fieldwork** - A compulsory 4 day field trip will be held during mid-session break, as outlined within these notes, final details later. The cost covers all transport, food and accomodation (see below for payment details).

### Payment of Field Trip and Refunds

- It is the School's policy that payment must be received in advance of the field trip.
- In this case payment must be received no later than 2 weeks before the field trip, i.e. No later than **Monday 2nd March 2020 (i.e. Week 3)**
- Payment can be made online from the link that will be provided on Moodle.
- If a student decides not to go on a course field trip they must inform us sufficiently far in advance (preferably 2 weeks prior to the trip) for us not to incur costs for transport, food etc, otherwise they will not get a refund.
- The cut off date for refunds will be no later than 7 days prior to the trip i.e. **Friday 6th March 2020**.
- If you fail to attend the field trip or have provided insufficient notice for cancellation, **NO REFUND WILL BE GIVEN**.
- A refund will be given in the event of serious documented misadventure. Please contact the course convenor to discuss this.

**Laboratories** - Bring **dissecting kit**, (rubber gloves and lab coat if necessary; no sandals, thongs etc), pencil and paper, this lab guide, any invertebrates/fish text. Attendance at labs will be taken.

**Final Exam** - The final exam will be held during the normal examination period. Some past exam papers are included in these notes, but note that subject matter varies annually, and some questions may not be relevant to this year's exam.

**Interested in an honours year?** Consult a possible supervisor as soon as possible (before Oct/Nov. for Feb start). See school web site.

**Web site:**

Teaching materials will be made available via Moodle.

<https://moodle.telt.unsw.edu.au/login/index.php> When you logon to Moodle this course will automatically be available to you provided you have correctly enrolled in it.

<http://www.bees.unsw.edu.au/> is where you find our main website, and

<http://www.famerlab.com.au> is Iain Suthers' research website.

**Laboratory safety regulations.** See Section 10 – but in essence, it is compulsory to wear a lab coat, to wear shoes that are strapped to your foot, and no bare toes, and tie back any long hair. These regulations are enforceable and if you do not comply you may not be allowed to attend the laboratory.