

## GENERAL COURSE INFORMATION

Coordinator: Dr. Bridie Allan, Dept. of Marine Science, [bridie.allan@otago.ac.nz](mailto:bridie.allan@otago.ac.nz)

Office Hour: Thursday 10am, Room 149, Department of Marine Science, or by appointment.

Teaching Fellow: Dr. Pete Russell, Dept. of Marine Science, Room 141,  
[peter.russell@otago.ac.nz](mailto:peter.russell@otago.ac.nz)

Other lecturers: Dr. Linn Hoffmann, Department of Botany,  
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Prof. Cliff Law, NIWA and Department of Chemistry,  
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Dr. Robert Smith, Dept. of Marine Science, Room 150  
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## COURSE DESCRIPTION

We study the interactions of biological and physical processes in the ocean and how physical processes regulate the productivity and distribution of organisms in oceanic and coastal ecosystems, from the microscale to the macroscale.

## LEARNING OUTCOMES

- Understand the biological structure of the ocean and the interdependence of marine biological and physical processes.
- Understand the continuum of spatial and temporal scales of oceanographic processes and the different approaches required to study them in marine ecosystems.
- Understand, define, and use correctly the basic principles and concepts of biological oceanography.
- Understand the role played by marine organisms in the carbon cycle and in global climate change.
- Develop basic practical and technical skills necessary for conducting biological oceanographic research cruises.
- Design experiments to evaluate the effect of physical processes on marine organisms over different scales.
- Critically evaluate a scientific journal article from the biological oceanography literature and be able to describe the basic hypotheses, experimental design, results, and interpretation of the data as they are presented.
- Communicate and discuss science verbally with a critical and objective view.

## COURSE OUTLINE

The overall design of this course includes lectures, one field trip, practical's/tutorials and seminars.

### 1. Lectures

The lectures are grouped as three interconnected sections dealing with biophysical processes in marine environments from microscale to meso- and macroscale processes (see lecture titles in the Table below).

### 2. Seminars

Each student will prepare an oral presentation (14 minutes of presentation + 1 minute of questions) about a scientific research paper (provided by the instructor). At each of three seminars, 5-6 students will each present one article. The oral presentation should properly introduce the topic, outline the hypotheses tested in the paper, discuss the methods used to test those hypotheses, explain the results, and evaluate the discussion of those results.

Presenting a scientific paper in this manner requires the students not only to have read and understood the paper they are presenting but also to understand the background of the paper and why the questions the scientists are asking are interesting and relevant. One of each paper will be randomly assigned to each student.

### 3. Field trip, lab practicals and tutorials

A field trip to study the picoplankton of Otago Harbour will be conducted from the research vessel Beryl Brewin. At each station, water column temperature, salinity, and depth will be measured using the CTD interfaced with a fluorometer for the measurement of in situ fluorescence (a proxy for phytoplankton biomass). Samples for nutrients, picoplankton abundance and metabolic activity will also be collected with Niskin bottles.

Samples will be analysed in three subsequent labs at Portobello Marine Laboratory (PML). Tutorials dealing with data analysis, presentation and experimental design will provide support to students who are working on their written assessments.

Journal club will provide students with an opportunity to disseminate important pieces of scientific literature that relate directly to the material covered in the lectures. Here, students will be assigned a scientific paper to read, followed by 10 questions to answer which will be discussed during the tutorial. Students are responsible for contributing to the critical evaluation of the literature after carefully reading and annotating each week's articles. 10% of your paper mark comes from journal club participation.

OCEN 322 Biological Oceanography

Lecture date	No.	Lectures (Mon, Thurs, 0900-0950)	Staff	Other activity	Seminars/Labs (Wed, 1400-1750)
08-Jul	1	Introduction and course outline	BA		
11-Jul	2	Brief history and BO in the context of Marine Sciences	BA	10-Jul	How to read and present a scientific paper
15-Jul	3	Spatial and temporal scales in Oceanography	BA	17-Jul	Journal club
18-Jul	4	Plankton and boundary layers. Biological effects of diffusion, turbulence and viscosity	BA		
22-Jul	5	Vertical structure of the open ocean: biology of the mixed layer (I)	LH	24-Jul	Assessment: student presentations
25-Jul	6	Vertical structure of the open ocean: biology of the mixed layer (II)	LH		
29-Jul	7	Upwelling (I): types, origin and distribution	RS	31-Jul	Assessment: student presentations
01-Aug	8	Upwelling (II): biological effects of upwelling jet currents and filaments	RS		
		<b>FIELD TRIP</b>		03-Aug	Field trip (4 August as weather contingency)
05-Aug	9	Coastal and oceanic eddies: formation and biological consequences (I)	BA	07-Aug	Lab 1: Using flow cytometry to quantify bacteria
08-Aug	10	Coastal and oceanic eddies: formation and biological consequences (II)	BA		
12-Aug	11	The biological significance of internal waves	RS	14-Aug	Lab 2: BIOLOG Ecoplate
15-Aug	12	Coastal and oceanic fronts: types and biological consequences (I)	PR		
19-Aug	13	Coastal and oceanic fronts: types and biological consequences (II)	PR	21-Aug	Tutorial: data report & experimental design
22-Aug	14	Coastal and oceanic fronts: types and biological consequences (III)	PR		
		<b>Mid-semester break 26 Aug - 3 Sep</b>			
02-Sep	15	Storm/cyclone induced primary productivity	PR	04-Sep	Journal club
05-Sep	16	Vertical structure in coastal waters: biological effects of freshwater run-off	LH		
09-Sep	17	Vertical structure in coastal waters: biological effects of tidal mixing	LH	11-Sep	Journal club
12-Sep	18	Biological consequences of ocean circulation variability (I)	RS		
16-Sep	19	Biological consequences of ocean circulation variability (II)	RS	18-Sep	Journal club
19-Sep	20	Annual sea ice formation and it's effects on primary producers	LH		
23-Sep	21	Expansion of oceanic Oxygen Minimum Zones: controls and consequences	LH	25-Sep	Journal club
26-Sep	22	The biological pump. Importance of marine organisms in the global carbon cycle	LH		
30-Sep	23	High nitrate and low chlorophyll (HNLC) areas	CL	01-Oct	Journal club
03-Oct	24	Effect of global climate change on marine organisms and carbon cycle	CL		
07-Oct	25	Review of critical concepts in Biological Oceanography I	BA		
10-Oct	26	Review of critical concepts in Biological Oceanography II	BA		

## ASSESSMENTS

Assessment	Value (%)	Due date
Oral presentation (in seminar)	10	17-Jul and 24 <sup>th</sup> Jul
Written assignment- research report	20	16 – Sep by noon
Written assignment- experimental	10	30-Sep by noon
Journal club	10	Throughout the semester
Final exam	50	TBA

### Oral presentation

Presentation (with PowerPoint) to introduce the main topic of the provided paper, outline the hypotheses, discuss the methods used and the results, and critically evaluate the discussion. A discussion with others is expected and will be part of the evaluation. Please submit a pdf of your presentation (6 slides to a sheet, as an email attachment) to Dr. Allan at least 24 h before your presentation.

#### Marking schedule for oral presentation

Introduction Clearly stated background, importance, aims/questions 10

Methods Clear and concise 10

Results Well-presented, summarized 10

Discussion Organized, accurate and well-supported 20

Conclusion Leads from discussion, related to aims, answers questions posed at outset 10

Citations Accurate, clear (on final slide) 5

Presentation Clarity, design, timing, professionalism, discussion feedback 35

**Total Marks 100**

### Written assignment – experimental design

Students will also be encouraged to think on their own by completing a written assignment in which they develop an experimental design required to study the effect of physical processes on the biology of New Zealand's marine communities. A description of the experimental design to target two processes, each one at a different scale (micro-, meso- and macroscale) should be provided. Students can choose which processes they want to study. This is a great exercise for the students to be able to put in context the importance of the different spatial and temporal scales in oceanography and how these scales are a continuum of interrelated processes that require different research approaches. A support tutorial will be provided. Maximum of 1000 words.

#### Marking schedule for experimental design

Introduction Background, importance, clearly stated aims 15

Methodology Clear, well presented, logical 40

Discussion of the methodology

Accurate and well-supported by evidence, answers question, fulfills aims 25

Citations, references Correct, complete, accurate 10

Presentation Title, overall format, writing style 10

**Total Marks 100**

### Written assignment – research report

Students will compile all the data from the field trip and the practicals to complete a written assignment consisting of an extended field trip report in the form of a scientific paper (i.e. introduction, methods, results and discussion), with a maximum of 3000 words, about 20 references, and with clear evidence of critical thinking and synthesis.

#### Marking schedule for research report

Abstract, introduction & Literature Review

Abstract, background, importance, evidence of literature review, clearly stated aims 15

Methods and Results Sensible, methods clearly explained, well presented, good quality figures and tables 40

Discussion and Conclusions Logical and organised, accurate and well-supported by evidence, answers question, fulfils aims 25

Citations and references Correct, complete, accurate 10

Presentation Title, overall format, writing style 10

**Total Marks 100**

### Formatting and submitting assignments

Assignments must be formatted for A4 paper, single sided, 1.5 spaced, with one corner staple, no binding or folders, in Times New Roman 12 point. Pages must be numbered and penalties will apply for exceeding the word limit. Use the CSE (Name-Year) citation style, as detailed in the 8th Edition of the CSE manual for Authors, Editors, and Publishers, copies of which are on reserve in the Science Library and online via the Science Library website.

References do not contribute to the word count.

All assignments for this course should be submitted as electronic copy to Dr. Allan before 12 noon on the day of the deadline. The electronic copy must be submitted by email as a word document and a pdf. Work handed in late will be penalised by 5% per day (including weekends) up until one week. Work handed in more than one week late will not be marked. Extensions are normally only given in cases of bereavement or illness (accompanied by a medical certificate) and are only available before assignment due dates.

### Missing Laboratories and fieldwork

Attendance at labs is compulsory and is a terms requirement to sit the final exam. If you have missed a lab due to illness, or extenuating circumstances (e.g. bereavement, representing New Zealand at a sporting event) then you must provide a medical certificate

that specifies you were ill on the date of your lab from your doctor, or a letter verifying the circumstances, and hand this to the coordinator or teaching fellow within two weeks of the date of the missed lab.

### Academic Integrity and Academic Misconduct

Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage. Students are expected to be aware of, and act in accordance with, the University's Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else's misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University's Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University's Academic Integrity website at <http://www.otago.ac.nz/study/academicintegrity> or ask at the Student Learning Centre or Library.

### **If you have any questions, ask your lecturer!**

Academic Integrity Policy

<http://www.otago.ac.nz/administration/policies/otago116838.html>

Student Academic Misconduct Procedures

<http://www.otago.ac.nz/administration/policies/otago116850.html>

### Communication

When the Department of Marine Science communicates with you, it will be via your student email address (@student.otago.ac.nz). Please make sure that you check this address regularly, or that you arrange forwarding to an address you check regularly. There will be a student representative chosen by students to take care of official communications and feedback for your group of students. Make sure you know who this person is.

This paper uses Blackboard, a web-based learning platform, to help manage teaching and learning in the course. On Blackboard you will find resource material and notices regarding the course. Please make sure you can access your own personal Blackboard page (go to

<http://blackboard@otago.ac.nz> and login using your university student username and password) and that all your courses are listed there.

### Required Materials

A lab coat is required at all practical sessions. You will not be allowed to participate without one. New lab coats are available from the Archway shop in the link next to the main library and also from Road Materials Workgear (4-6 Forth Street). Sharp lead pencils and an eraser are required, as is appropriate preparation for all labs, seminars, and lectures.

### Useful Links

- Department of Marine Science website: <http://www.otago.ac.nz/marinescience>
- University of Otago academic integrity policy  
<http://www.otago.ac.nz/study/academicintegrity>
- Student Learning Centre: <http://hedc.otago.ac.nz/hedc/sld.html> **University Library:**  
<http://www.otago.ac.nz/library/index.html>

### Support for international students

The Department of Marine Science encourages international students to seek support if they are having difficulties with their studies or meeting other challenges while enrolled as students at Otago. While your course coordinator and/or teaching fellow are both good people to ask for help, international students can also contact International Student Support: Telephone: 479 8344, Email [international.support@otago.ac.nz](mailto:international.support@otago.ac.nz) Website: <http://www.otago.ac.nz/international>, Location: Archway West Building.

### Help

If you are worried, upset, sick, technologically challenged, overtired, or overwhelmed, please ask for help. You can come see any staff member in Marine Science. You can send an email or give staff a call. You may refer questions to the Student Rep in the class if you don't feel comfortable asking yourself. If that won't work, find another person with whom you feel comfortable talking, or head over to Student Health, where they have counseling available. A variety of support services and additional educational opportunities are listed on the Blackboard site for this paper. Please advise Dr. Allan if you know of others that might be listed.

\*\*\*\*\*Please don't suffer alone. We all want you to succeed\*\*\*\*\*