

# MARI 301 Course Outline 2023

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Department of Marine Science • Te Tari Pūtaiao Taimoana  
University of Otago • Te Whare Wānanga o Ōtago  
Dunedin, New Zealand • Ōtepoti, Aotearoa

# MARI 301 Marine Ecology & Ecosystems 2023

## Course Co-ordinator

### Associate Professor Candida Savage

Portobello Marine Laboratory Rm 212

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Candida is a marine ecologist with a focus on coastal communities and ecosystems, from temperate estuaries and fjords to tropical coral reef ecosystems. She is particularly interested in the effects of multiple stressors including climate change on biological communities, food webs and biogeochemical processes. Current research projects include the effects of nutrient enrichment on food webs, nutrient subsidies from land-to-sea, restoration ecology, and carbon dynamics in fjords. Her position at Otago university is part-time.

## Teaching Fellow

### Dr. Jean McKinnon

Department of Marine Science, Rm 142

Email: [jean.mckinnon@otago.ac.nz](mailto:jean.mckinnon@otago.ac.nz), Phone 479 5453

Jean is a teuthologist or a cephalopod mollusc specialist with particular interests in how the lifestyle of an organism is recorded in hard body parts. She is also interested in the diet and trophic level of organisms. Jean is a keen scientific illustrator and photographer.

## Contributing Lecturers

### Professor Miles Lamare, HOD Marine Science

Miles has research interests in marine ecology, population biology, and marine invertebrate biology, focusing on the ecology and physiology of marine invertebrate larval stages. He has an interest in Antarctic marine invertebrates and how their physiology differs to temperate and tropical species.

### Dr Bridie Allan

Bridie works on fishes in tropical and temperate regions. She conducts research on how environmental changes can alter the mechanisms underlying population processes and community dynamics. Her research includes swimming performance in fishes, chemical ecology of predator-prey interactions, and environmental influences on predator-prey interactions.

### Dr Ursula Ellenberg

Ursula works at the interface of ecology, behaviour and physiology to address conservation challenges. Her position at Marine Science is part time as she also works as a research consultant working with NGOs and governmental agencies. Ursula is particularly interested in quantifying and mitigating human impacts on wildlife. Her research is usually applied in nature aiming to provide data that feeds into informed decision making for e.g. ecotourism or fisheries management.

**Dr Gaya Gnanalingam**

Gaya is a marine ecologist who focuses on species of fisheries value and their management. Her research is primarily on how science and policy can be integrated for the long-term sustainable use of fisheries resources, and she pairs scientific methods (field observations, laboratory experimentation, computer modelling) with policy analysis and legislative review.

**Dr Gert-Jan Jeunen**

Gert-Jan is a postdoctoral research fellow who focuses on environmental DNA (eDNA) and its use to monitor biodiversity.

**Dr Robert Smith**

Rob is a physical oceanographer with research interests in oceanic fronts, deep water formation and modern observational oceanography (satellites, floats and gliders). His current focus is on heatwaves and the influence of climate variability on the physics and biology of oceanic fronts in the Southern Ocean.

## **Welcome to MARI 301 Marine Ecology & Ecosystems**

The seas around New Zealand and its Antarctic territories alongside the wider Pacific region encompass a great diversity of marine habitats and endemic species, making this one of the most exciting places globally to study Marine Ecology and Ecosystems. Marine Ecology is the scientific study of marine habitats, populations, and interactions among organisms and the surrounding environment. These interactions include abiotic (non-living physical and chemical factors that affect the ability of organisms to survive and reproduce) and biotic factors (living organisms or the materials that directly or indirectly affect an organism in its environment).

During this course you will develop an understanding of key issues driving patterns and processes in marine ecosystems – from global patterns to local case studies. You will also learn about how climate change is affecting marine populations and ecosystems. You will collect and analyse real-world field data as you explore questions around key processes that underpin the health of marine ecosystems. You will learn about interactions between marine organisms and their environment, as well as current management and conservation initiatives at the cutting edge of marine science. You will also have an opportunity to develop essential science skills including data collection, analysis and presentation and communication.

The fieldwork, laboratories and workshops are designed to reinforce ideas presented in the lectures. Attendance of fieldwork, labs/workshops is compulsory.

The course is designed around four themes: (1) Patterns and processes in the marine environment – patterns from local to global scales; and processes that underpin healthy ecosystems, including productivity and organic matter cycling; (2) Connectivity – larval ecology and metapopulation structure (3) Interactions among species including food webs, and predator-prey dynamics; and (4) Applied ecology including management and conservation. We will explore these concepts using case studies from intertidal estuaries to deep fjords, from tropical coral reefs to Antarctica and covering the myriad of marine organisms that characterize the marine realm. Many of these themes overlap in the lectures and associated workshops.

### **Specific learning objectives**

At the end of this course, students will be able to:

1. Explain how patterns affect processes in marine ecosystems, from local to global scales.
2. Understand how climate change is directly and indirectly affecting marine ecosystems.
3. Understand how interactions between components of an ecosystem affect community structure and ecosystem functioning.
4. Recognise the importance of flows of organic matter and connectivity for food web structure in the marine realm.
5. Apply ecological knowledge to applied issues including coastal management and conservation of the marine environment.
6. Collect and analyse scientific information and present the results effectively and accurately.
7. Compare and contrast different approaches used to study marine ecology.

## Workload

2 lectures per week

Mondays 12:00 – 12:50  
Tuesdays 11.00 – 11.50 am

1 practical/workshop per week

Practicals: includes Field trips, PML labs and computer (CAL) labs (weeks 10–13, 16, 21):

Mondays 14:00 – 17:50\* (stream A1), or  
Tuesdays 14:00 – 17:50\* (stream A2), or  
Wednesdays 14:00 – 17:50\* (stream A3)

Workshops (weeks 14, 18-20):

Mondays 14:00 – 16:50 (stream A1)  
Tuesdays 14:00 – 16:50 (stream A2)

Plus 1 compulsory full-day field experiment in a local coastal ecosystem: **Sat 18 March 08:00 – 17:00 (B1)**

\*Please note that there are three streams for the practicals (Portobello labs and CAL exercises) and field days due to space restrictions on the boat and at the lab. These are scheduled for weeks 10, 11, 12, 13, 16, 21). Field trips and practicals at the Portobello marine laboratory (PML) will end around 17:00 and we will bus you back to arrive in town by 17:50.

We have arranged a bus to transport you for the fieldwork and labs at Portobello. The bus will leave at 14:00 SHARP outside Preens Drycleaners on Castle Street, opposite the Marine Science department in town. You need to sign the attendance form before you get on the bus, so please arrive at Preens by 13:50 on the days where we are doing field work or labs at PML.

You CANNOT take your own car to PML or to the field due to strict University regulations and field plans and limited parking space.

Due to limited space on the research vessel *Polaris* and in the Batham lab at PML, please DO NOT change which day you come to practicals, unless by prior arrangement with Jean or Candida. Workshops are more flexible, within reason.

There are two streams for the workshops on campus (weeks 14, 18, 19, 20) and these will end by 17:00.

Consult Blackboard for any changes or updates to the Timetable.

If we have to reschedule any classes, we will put this information on Blackboard, which will also email your university email account directly. Please note that all correspondence relating to MARI301 will be to your Otago University email address.

We expect you to attend all practicals/field trips/workshops. Attendance is worth 5% of your final grade for the paper. We also expect you to attend lectures in person whenever possible.

## Assessment

### *Internal assessment:*

Participation	5%
Online quizzes	5%
Carbon consumption and functional diversity	10%
Ecosystem functioning (fluxes)	15%
Biodiversity (eDNA vs traditional)	10%
Marine protected areas & science communication	5%

### *Deadline:*

Practicals, field trips & workshops
During semester 1
31 March 12 noon
24 April 12 noon
5 May 12 noon
26 May 12 noon

*Final exam:* 50%

**NOTE:** lectures, laboratory and practical work and field trips plus indicated reading material are all examinable.

## Submitting assignments

All internal assignments for this course should be submitted as a hard copy in the Marine Science department. The hard copy must be accompanied by the standard **Marine Science cover page**, which will be available on blackboard. Don't forget to include your name and student ID so you get the marks!

Assignments must be formatted for A4 paper, single sided, double spaced. Hard copies should have one corner staple, no binding or folders. Pages must be numbered.

Assignments must be submitted by the deadline. Extensions are normally given only in cases of bereavement or illness with a valid medical certificate. Late penalty is 5% of total marks per day including weekend days.

Unless specifically stated, all assessed work must be completed and submitted on an individual basis. Students should be familiar with the University's policy on dishonest practice, and ensure that all work submitted is their own.

## **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 [www.otago.ac.nz/study/academicintegrity](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 ([www.otago.ac.nz/administration/policies/otago116838.html](http://www.otago.ac.nz/administration/policies/otago116838.html)) Student Academic Misconduct Procedures (<http://www.otago.ac.nz/administration/policies/otago116850.html>)

### **Plagiarism**

Plagiarism is defined as copying or paraphrasing another's work, whether intentionally or otherwise, and presenting it as one's own (definition approved University Council, December 2004). Plagiarism, namely copying from another person's work without due acknowledgement, is unacceptable and will result in a severe penalty. Software checks are available to pick up plagiarism and we will put all assignments through TurnItIn. Students should make sure that all submitted work is their own. Any student found responsible for plagiarism in any piece of work submitted for assessment shall be subject to the University's dishonest practice regulations which may result in various penalties, including forfeiture of marks for the piece of work submitted, a zero grade for the paper, or in extreme cases exclusion from the University.