

**Faculty of Science Course Syllabus
Department of Biology
BIOL/MARI 3761 Marine Ecology
Fall 2016**

Instructor(s):	Robert Scheibling	rescheib@dal.ca	LSC 3089
	John O'Brien (TA)	j.obrien@dal.ca	LSC 3087
Lectures:	MW: 10:35-11:25	LSC Rm C208	
Laboratories:	One field trip		
Tutorials:	Six 1-hour tutorials		

Course Description

Building upon an understanding of basic ecological and evolutionary principles, and a familiarity with the major marine invertebrate and algal taxa, this course examines patterns and processes at organismal, population and community levels that determine the diversity and distribution of life in the sea.

Course Prerequisites

[BIOL 2060.03](#) (or [BIOA 3001.03](#)) and ([BIOL 2003.03](#) or [BIOL 2004.03](#)), and [OCEA 2000X/Y.06](#) or ([OCEA 2001.03](#) and [OCEA 2002.03](#))

Course Objectives/Learning Outcomes

- Contrast the physical and chemical environment in the ocean with that on land, and explain how the ocean milieu has shaped the evolution of life and the structure and functioning of marine ecosystems
- Explain the interplay of biological interactions and physical factors in determining patterns of intertidal zonation on rocky shores
- Contrast developmental strategies of marine invertebrates with larval forms, in terms of evolutionary trade-offs and biogeographic patterns
- Account for variation in patterns of larval dispersal, settlement and recruitment among benthic invertebrates, in terms of oceanographic features and biological factors
- Explain processes that determine patterns of distribution, abundance and productivity of kelp beds/forests along temperate coasts

- Explain the roles of disturbance and biological interactions (competition, grazing, predation and disease) in shaping community organization in kelp beds/forests worldwide, and the impact of invasive species on the kelp-bed ecosystem of the Northwest Atlantic
- Describe the distribution, environmental features, and trophic structure of tropical coral reefs
- Account for the high productivity and diversity of coral reefs, and their vulnerability to environmental stressors and human impacts
- Describe the physical, chemical and biological environment of the deep-sea, and explain how this accounts for patterns of species abundance and diversity
- Account for the high productivity and biomass, but low species diversity, at hydrothermal vents
- Evaluate the effects of humans, past and present, on marine species, populations and ecosystems worldwide
- Conduct a manipulative field experiment and statistically analyze and interpret the results in the form of a scientific paper
- Work in teams to critically evaluate an anthropogenic impact in a marine system (at the species, population, or community level) and present an oral report in the form of a conference presentation

Course Materials

- Suggested Text: Nybakken JW and Bertness MD (2004) Marine Biology: An Ecological Approach. 6th Edition. Benjamin Cummings, San Francisco
- Course website: Brightspace

Course Assessment

Components	Weight (% of final grade)	Date
Midterm exam	25	Nov 2 (In class)
Final exam	45	(Scheduled by Registrar)
Field trip report	25	Nov 16
Oral Presentation	5	(Throughout term)

Conversion of numerical grades to Final Letter Grades follows the [Dalhousie Common Grade Scale](#)

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

Course Policies

A late penalty of 10% per day will be applied to the field trip report. A missed exam may be replaced with a make-up exam pending a written excuse from a health practitioner.

Course Content

Module 1: Life on land and in the sea: worlds of contrast

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|------|---|-------------------------------------------------------------------------------------------|
| Sept | 7 | CLASS INTRODUCTION
Physical/chemical environment, suspension, swimming; filter feeding |
| | 9 | Light, sound, & pressure; ecosystem structure & function |

Module 2: The rocky intertidal zone: a test bed for ecological theory

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|----|-----------------------------------------------------------------------------------------------------------------|
| 12 | Environment, zonation
Tutorial 1: Field project design and background |
| 14 | Competition & predation
Student presentation groups assigned |
| 16 | Biological & physical factors; seaweeds & grazing |
| 17 | FIELD TRIP: Sandy Cove, Sambro (12:00-17:00; 0.2 m, 15:24) |
| 19 | Patchiness, succession, disturbance, latitudinal gradients
Tutorial 2: Field data collation & image analysis |
| 21 | Vignette: intertidal adaptations - brittle stars, limpets
Presentation outlines submitted |

Module 3: Reproduction, larval ecology, & recruitment

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| 23 | Asexual & sexual reproduction, fertilization rate
Presentation schedule announced |
| 26 | Larval developmental strategies, mortality
Tutorial 3: Field data presentation |
| 28 | Dispersal, larval behaviour, settlement, recruitment |
| 30 | Vignette: fertilization ecology of free-spawners, coral mass spawning |

Module 4: The rocky subtidal zone: a hot bed of biological interactions

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| Oct | 3 | Habitats, biological & physical factors, hydrodynamics
FIELD REPORT: Data entry complete
Tutorial 4: Field data interpretation |
| | 5 | Kelp beds/forests: distributional patterns, productivity |
| | 7 | Group presentation 1 |
| | 10 | THANKSGIVING HOLIDAY |
| | 12 | Grazing, predation, disturbance |
| | 14 | Group presentation 2 |



	17	Urchin-kelp interactions, trophic cascades Tutorial 5: Scientific Writing
	19	Urchin-kelp interactions, trophic cascades
	21	Group presentation 3
	24	Vignette: Alternative states of coastal ecosystems FIELD REPORT: Draft 1 figures due (No Tutorial)
	26	Vignette: Climate change and ecosystem dynamics
	28	Group presentation 4
		<u>Module 5: Tropical coral reefs: Oases in a desert ocean</u>
	31	Reef distribution, origin & structure, biological assemblages FIELD REPORT: Draft 1 figures returned Tutorial 6: Field report Q & A
NOV	2	MIDTERM EXAM (Modules 1-4)
	4	Group presentation 5
	7-11	FALL STUDY BREAK & REMEMBRANCE DAY HOLIDAY
	14	Coral biology & algal symbiosis
	16	Coral productivity, species interactions, disturbance FIELD REPORT DUE
	18	Group presentation 6
	21	Human impacts, climate change and the fate of reefs
	23	Vignettes: Coral bleaching; fish predation on reefs
		<u>Module 6: The deep: mountains, plains & hot springs</u>
	25	Environment, patterns of abundance & diversity
	28	Adaptations, symbioses, biological processes
	30	Hydrothermal vents
		<u>Course review</u>
Dec	2	Exam preparation, review
	5	Course review and evaluation (optional)

ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of

the regular academic year. More information and the ***Request for Accommodation*** form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's ***Policy on Intellectual Honesty*** and ***Faculty Discipline Procedures*** is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

“The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.”

The full text of the code can be found here:

http://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with <ul style="list-style-type: none"> - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties 	Killam Library Ground floor Rm G28 Bissett Centre for Academic Success	In person: Killam Library Rm G28 By appointment: <ul style="list-style-type: none"> - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: <ul style="list-style-type: none"> - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) <ul style="list-style-type: none"> - Learn to integrate source material into your own work appropriately - Learn about disciplinary writing from a peer or staff member in your field 	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: <ul style="list-style-type: none"> - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca