DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Department of Biology
BIOL/MARI 3680
Scientific Diving Methods in Ecology
Summer 2019

Instructor(s):	Tyler Eddy	tyler.eddy@dal.ca	Office location	Off campus
	John Lindley	john.lindley@dal.ca		LSC 1814

Lectures: Daily 9:00 - 10:30 at Dalhousie University

Laboratories: Daily field work 10:30 - 17:30 in Duncan's Cove

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Course Description

This course introduces students that are certified divers to the practice of underwater research using SCUBA. It combines lectures with supervised dives in various marine habitats to demonstrate the application of standard sampling and experimental procedures in marine ecology, with an emphasis on logistical considerations and diving safety.

NOTES: Offered every other summer through the SEASIDE program. An auxiliary fee is charged to cover costs of dive trips. For dates, times and special registration procedures, see seaside.science.dal.ca.

Course Prerequisites

BIOL 2003.03 and BIOL 2060.03 (or BIOA 3001.03) and STAT 1060.03 or SCIE 15xx, and an internationally recognized diving certification, and a diving physical. Recommended: BIOL 3221.03/MARI 3221.03, BIOL 3301.03

Course Objectives/Learning Outcomes

Content

1. Identify considerations for program planning, and site selection and set-up, for scuba-based research
2. Contrast methods of mapping habitats and the distribution and abundance of marine organisms
3. Contrast methods of marking or tagging marine organisms to measure movement, growth or population characteristics
4. Identify tools and instruments used for recording physical variables in shallow marine habitats and methods of deployment
5. Evaluate options for use of underwater photography in studies of behaviour, distribution and abundance of marine organisms

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6. Explain critical elements of sampling and experimental design as they relate to subtidal research using scuba
7. Identify specialized applications of scientific diving in varying marine environments

Skills
1. Conduct experiments and sample marine populations to gain experience in scientific diving
2. Analyze field data and evaluate the efficacy of scuba-based procedures

Course Materials

Reference Texts (in-class reference copies available):

Kingsford , M. and Battershill C. 1998. Studying Marine Environments: a handbook for ecologists. Canterbury University Press

Coyer, J., Stellar, D. and Witman J. 1999. The Underwater Catalog. 2nd Ed. Shoals Marine Laboratory

Additional readings: lecture notes, journal articles, manuals, technical reports and websites

OWL site: lecture notes (including colour illustrations), field exercises, ACUC dive tables, syllabus, schedule etc.

Course Assessment

Field exercises: 40%

Students submit extended dive logs listing accomplished tasks, working conditions, problems encountered, etc) and transcribed data sheets (where applicable) after each exercise. Students participate in post-dive discussion and analysis of methods/tasks.

Final Exam: 60%

Students design a dive program to address a scientific question (e.g. drawn from list generated during post-dive discussions, specified by instructors, or determined by the student).

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

Students must be certified divers, preferably with recent cold-water diving experience, have completed a recent diving medical, and have arranged a checkout dive with the diving safety officer (John Lindley) before registering in the class.

The following schedule depends on safe diving conditions for each day, and is subject to change depending on actual conditions, especially weather. Do not plan important appointments or events on the "days off" because these may be used for making up field exercises and lectures missed because of unforeseeable conditions. There will also be homework, largely preparation of field logs, that will

occupy your evenings. We will endeavour to stick to the daily schedule and return to Dalhousie by 17:00, but this is also variable depending on travel, weather, and working conditions.

Students are responsible for bringing their own diving equipment (wetsuit or drysuit, regulator, BC, weights, gauges or computer, mask, snorkel, fins; tanks and tank fills will be provided), and food, water, and personal items such as sunblock, hat, and sunglasses for shore work.

Daily schedule:
09:00 - 10:00 Lecture
10:00 - 10:30 Review exercise, transport gear to vehicles
10:30 - 11:30 Travel to site, unload vehicles
11:30 - 13:00 Dive 1
13:00 - 14:30 Surface interval: lunch, data collation, discussion/lecture
14:30 - 16:00 Dive 2
16:00 - 16:30 Post dive: Clean-up, data collation, load vehicles
16:30 - 17:00 Travel to Dalhousie

Course schedule:

	Lecture	Field exercise
Wed 14	Course introduction *(12 pm start)*	*Mandatory check-out dive in Aquatron @ Dal*
Thu 15	1. Program planning – John Lindley 2. Specimen collection	1. Site survey, collection
Fri 16	3. Habitat mapping 4. Measuring abundance	2. Sampling benthos
Sat 17	5. Tagging & marking	3. Tagging benthos
Sun 18	*Day off**	
Mon 19	6. Animal movement	4. Animal movement 1
Tue 20	7. Sampling design	5. Animal movement 2
Wed 21	8. Environmental measures	6. Environmental measures
Thu 22	9. Photography	7. Photographic sampling
Fri 23	10. Sampling Fish	8. Sampling Fish
Sat 24	11. Experimental design	9. Field experiment
Sun 25	*Day off**	
Mon 26	12. Skills training *Exam hand-out*	10. Performance Tasks
Tue 27	13. Photographic evaluation (@ Dal)	*Optional night dive*
Wed 28	14. Special applications – John Lindley	
Thu 29	15. Guest lecture	
Fri 30	*Exam due*	

**Days off may need to be used for field exercises depending on weather – please keep them open*

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:

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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

COPYRIGHT

All members of the Dalhousie community are expected to comply with their obligations under Canadian copyright law. Dalhousie copyright policies and guidelines, including our Fair Dealing Guidelines, are available at http://www.dal.ca/dept/copyrightoffice.html. Copyright questions should be directed to the Copyright Office at copyright.office@dal.ca.

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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 - 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: - 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: - 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) - 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: - 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**