DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Department of Biology
BIOL/MARI 3680
Scientific Diving Methods in Ecology
August 16 – 31, 2021

Our ability to offer this course in-person for Summer 2021 will depend on the health and safety regulations in place at the time. If in-person field courses are not permitted, this course will be cancelled.

Instructor(s): TBD

John Lindley john.lindley@dal.ca Room: LSC 1814 Phone: (902) 494-2090

Teaching assistants: TBD

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
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):

1. Kingsford , M. and Battershill C. 1998. Studying Marine Environments: a handbook for ecologists. Canterbury University Press
2. 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

Brightspace site: lecture notes (including colour illustrations), field exercises, ACUC dive tables, syllabus, schedule etc. Lecture notes will be made available the evening before each lecture.

Course Assessment

Field exercises: 40%

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

Final Exam: 60%

Students design a dive program to address a scientific question 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 arrange a checkout dive with the diving safety officer John Lindley.

The 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, mask, snorkel, fins), as well as food, water, and personal items such as sunblock, hat, and sunglasses for shore work.

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

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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**

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Tentative course schedule BIOL/MARI 3680 Aug. 2021

Day	Activity
Mon 16th	**10:00** Lecture 1: Course introduction (TBD) **11:00** Lecture 2: Site selection and program planning (JL) **12:00** Lunch + move gear to Aquatron **13:00** Checkout dives in the Aquatron (JL)
Tue 17th	**09:00** Lecture 3: Scientific diving skills (performance tasks intro) **10:00** Performance tasks in the Aquatron / CAUS dive tables (two groups alternating) **13:30** Return to dive locker to wash and dry dive gear, then lunch **15:00** Lecture 4: Habitat mapping (TBD) **16:00** Dive briefing and pack dive gear (TBD)
Wed 18th	**08:00 – 16:00** FIELD WORK (Sandy Cove) Dive 1: Site set-up (Navigation, habitat description, specimen collection) Dive 2: Site survey (Deploy gridlines, georeference positions)
Thurs 19th	**09:00** Lecture 5: Measuring abundance (TBD) **10:15** Lecture 6: Sampling design (TBD) **12:00** Lecture 7: Animal tagging (TBD) **13:00** Dive briefing and pack dive gear (TBD)
Fri 20th	**08:00 – 16:00** FIELD WORK (Sandy Cove) Dive 3: Measuring abundance (Belt transects, circular plots) Dive 4: Quadrat sampling (quadrats, airlift) Dive 5: Measuring growth of tagged kelp
Sat 21st	**09:00** DAN O2 course (TBD) or dive comms Aquatron dive (JL) (two groups) **13:00** Lunch **14:00** Lecture 8: Animal movement (TBD) **15:00** Dive briefing and pack dive gear (TBD)
Sun 22nd	**08:00 – 16:00** FIELD WORK (Paddy's Head) Dive 6: Collecting hermit crabs for tagging Surface interval – marking of hermit crab shells Dive 7: Hermit crab release, collect snails for tagging Surface interval – marking snail shells Dive 8: Map release points, release marked snails
Mon 23rd	**08:00 – 16:00** FIELD WORK (Paddy's Head) Dive 9: Census of hermit crabs Dive 10: Relocate snails and measure movement
Tue 24th	**09:00** DAN O2 course (TBD) or dive comms Aquatron dive (JL) (two groups) **13:00** Lunch **14:00** Lecture 9: Environmental measures (TBD + short break **15:15** Lecture 10: UW photography (TBD) **16:00** Dive briefing and pack dive gear (TBD)

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Wed 25th	**07:00 – 18:00** FIELD WORK Meet at Dal and drive to dive site TBD Dive 11: Bathymetry Dive 12: Rugosity, advection Dive 13: Photography – photo quadrats, video transects Return to Dal wash and dry dive gear
Thurs 26th	Day off
Fri 27th	**09:00** Photo analysis workshop (TBD) **12:00** Lunch **13:00** Lecture 11: Fish surveys (TBD) + short break **14:15** Lecture 12: Experimental design (TBD) **15:30** Dive briefing and pack dive gear (TBD)
Sat 28th	**08:00 – 16:00** FIELD WORK (Paddy's Head) Dive 14: Fish survey and size estimation Dive 15: Urchin cage experiment Dive 16: Eel grass survey
Sun 29th	**09:00** Meet at dive locker and move dive gear to Aquatron **09:30** Performance tasks Part 2 in the Aquatron **12:30** Wash and dry dive gear, then lunch **13:30** Lecture 13: Special applications (JL) **14:30** Student dive experiences **16:00** Performance task results **16:30** BIOL3680 exam brief
Mon 30th	**09:00** Optional CAUS Level 1 course and exam (JL) **16:00** Course feedback evaluation **17:00** Night dive, BBQ, performance task awards (***optional***)
Tue 31st	Day off
Wed 1st	Day off - exam due at MIDNIGHT!