
**Faculty of Science Course Syllabus BIOL/MARI 4323 'Biologging in Ecology'
Department of Biology, Dalhousie University, Fall Term 2016
Instructor: Dr. Sarah E. Gutowsky, sarahegutowsky@gmail.com
Lectures (Tues/Thurs 8:35-9:55) & Labs (Tues 1435-1725): LSC 220
*Office hours by email appointment only**

Course Description from the Dalhousie Academic Calendar

This course explores the fundamentals and applications of biologging and biotelemetry: the use of electronic tags to study free-ranging animals and their environment. Students are introduced to the wide range of tags and their diverse applications in biology.

Course Prerequisites

BIOL 2060.03 (Introductory Ecology) or BIOA 3001.03 (Ecology) or PSYO/NESC 2160.03 (Animal Behaviour) or permission of the instructor.

Course Materials

All course materials will be provided through the Brightspace website and email announcements. Students are expected to check the site daily for course updates and to carefully and promptly read all course emails. There is no assigned textbook for this course.

Course Overview

With rapid technological advances over recent years, studies of the spatial ecology, behaviour, ecophysiology, and conservation of wildlife have expanded to include biologging technologies as solutions to investigating many previously unanswered questions. This course is designed to equip students with the knowledge and practical skills necessary to effectively plan and conduct biologging research. The course will cover the most relevant technologies in the field such as VHF-telemetry, satellite and acoustic telemetry, Global Positioning Systems (GPS), Global Location Sensing (GLS) light-based technologies, in situ image- and video-capture, accelerometers and physiological sensors as they apply to the study of marine ecology. Course activities include lectures, demonstrations, computer labs and practical exercises, providing background on the theory behind biologging research, ethical and study design considerations, and introducing students to current analytical techniques, data processing tools and visualization software.

Course Learning Objectives

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

- 1) *Describe* the evolution of biologging science through time.
- 2) *Compare* currently available biologging approaches and explain their applications, their advantages, and their limitations.
- 3) *Understand* the ethical, social, and economical considerations that should be incorporated into the design of any biologging study.
- 4) *Analyze and display* a variety of biologging data using a variety of statistical techniques and data processing tools.
- 5) *Critically evaluate* current literature on the applications of biologging methods to a variety of species and topics.
- 6) *Integrate* knowledge of principles and methods into the design of a research proposal that effectively addresses a realistic and unique problem.
- 7) *Communicate* scientific ideas effectively both in writing and through public speaking and structured oral presentations.

Student Evaluation

Professionalism.....15%
Lab Write-Ups20%
“Today in Tagging”10%

Research Proposal Outline.....5%
Proposal Peer Review.....10%
Proposal Presentation.....10%
Final Research Proposal.....30%

Tentative Course Calendar

Invited guest speakers are indicated by *italics*. Due dates are shown in non-bold font, all submissions due online by 11:59pm of due date.

Date	Lecture or Lab	Topic
06 – Sep	Lecture	Course overview & introduction to Biologging
08 – Sep	Lecture	Geospatial Data I
13 – Sep	Lecture	Geospatial Data II
13 – Sep	Lab	Oral & Written Skills in Science
15 – Sep	Lecture	Linking the Environment with Geospatial Data
20 – Sep	<i>Lecture</i>	<i>VHF Radio Telemetry – Dr. Rob Ronconi</i>
20 – Sep	Lab	VHF Radio Telemetry
22 – Sep	Lecture	Foraging Ecology
27 – Sep	<i>Lecture</i>	<i>Acoustic telemetry – Vemco</i> (VHF Radio Lab Due)
27 – Sep	<i>Lab</i>	<i>Acoustic telemetry – Vemco</i>
29 – Sep	<i>Lecture</i>	<i>Sturgeon & acoustic telemetry – Montana McLean</i>
04 – Oct	Lecture	Ecophysiology
04 – Oct	Lab	Today in Tagging Presentations
06 – Oct	<i>Lecture</i>	<i>Penguins & ecophysiology – Dr. Glenn Crossin</i>
11 – Oct	<i>Lecture</i>	<i>Sharks & conservation – Manuel Durueil</i>
11 – Oct	Lab	Today in Tagging Presentations
13 – Oct	<i>Lecture</i>	<i>Accelerometry – Dr. Fran Broell</i>
18 – Oct	<i>Lecture</i>	<i>CritterCams – Susan Heaslip</i> (Proposal Outline Due)
18 – Oct	Lab	Biologging in the Media
20 – Oct	<i>Lecture</i>	<i>The Ocean Tracking Network & Seals – Benia Nowak</i>
25 – Oct	Lecture	Ethics in Biologging
25 – Oct	Lab	Device Attachment – Seabird Case Studies
27 – Oct	Lecture	Complicated Data
01 – Nov	Lecture	<i>Spatial Statistics – Marie Auger-Methe</i>
01 – Nov	Lab	Intro to map-making for proposals in ArcGIS I
03 – Nov	Lecture	Intro to map-making for proposals in ArcGIS II
06 – Nov	--	Proposal Draft For Peer Review Due
11 – Nov	--	Proposal Peer Review Due
07 – Nov to 11 – Nov FALL BREAK		
15 – Nov	<i>Lecture</i>	<i>Biologging & Graduate School – Katie Studholme</i>
15 – Nov	Lab	Instructor available for proposal feedback
17 – Nov	Lecture	Proposal Presentations (4)
22 – Nov	Lecture	Proposal Presentations (4)
22 – Nov	Lab	Proposal Presentations (6)
24 – Nov	Lecture	Proposal Presentations (4)
29 – Nov	Lecture	Proposal Presentations (4)
29 – Nov	Lab	Proposal Presentations (6)
01 – Dec	Lecture	Proposal Presentations (4)
05 – Dec	--	Final Research Proposal (with GIS lab) Due

Details of Student Evaluation

Professionalism = 15%

A significant focus of this course is developing professional skills useful for successful careers in science and beyond. To encourage honing professionalism, students will be evaluated according to three components:

1) preparedness for guest speakers (5/15%). A major highlight of this course will be a guest lecture series from specialists in biologging, to provide the most topical information on the current state of science and technology in this field. The success of this series relies heavily on student engagement, which is enhanced when students arrive prepared. Students can earn up to 0.5% per speaker by preparing and submitting thoughtful questions for our guest based on online research of a guest's personal and professional website and scientific publications. -0.25% will be deducted for questions submitted on the speaker's day but after the lecture, or for poor quality submissions. Examples will be provided in lecture before our first guest speaker.

2) course contributions (5/15%). For all lectures and labs, students are expected to be actively engaged and willing to participate voluntarily. A score out of 5 will be given at the end of the semester based on contributions made in lectures and labs, especially (but not limited to) contributions during guest speakers and student presentations.

3) attendance and time management (5/15%). Attendance in this course is not optional, and is particularly important for guest speakers, labs, and student presentations. Each student will begin the semester with 5 points, and will only lose points for absences or late arrivals without acceptable excuses (-0.5%). Plan to attend and contribute to every class, and manage your time wisely to arrive on time. Students are expected to arrive at least *5 minutes before* lectures and labs are scheduled to begin, to avoid unnecessary disruption to classmates and speakers.

"Today in Tagging" Presentation = 10%

In assigned groups of 3, students will prepare a short (12 minutes + 3 minutes for questions) PowerPoint presentation summarizing a recent marine biologging study (publication year 2014-2016). This exercise serves four purposes: (1) To expose students to the greatest variety of marine biologging science applications beyond the course content, (2) To allow students an opportunity to share a topic of personal interest, (3) To give students an opportunity to hone presentation preparation and oral communication skills, and (4) to illustrate the necessity of working effectively with colleagues. Presentations will take place on October 4th & 11th; the order and groups will be assigned after the last day to drop fall classes (September 19th). Content elements will summarize: background, questions, hypothesis and predictions, methods, results, conclusions and future research directions. Students will watch a video recording of their presentation (and will need to do so to receive full marks). *Disclaimer: Presentations will be recorded for the Instructor's use only and video content will not be published or made publicly available without student consent.

Research Proposal Project = 55%

The major term project for this course will be the development of a research proposal addressing any question in marine ecology using any combination of biologging techniques. Students will integrate their knowledge of principles and methods from the course content into the design of a research project that effectively addresses a realistic ecological problem. This exercise will serve to introduce students to the process of crafting hypotheses and predictions, and writing effective scholarship and grant applications. An outline will be due on October 18th (5%), followed by a full draft for peer review on November 6th (5%), peer review completed by November 11th (5%), and the final proposal on December 5th (30%). The students will also have the opportunity to present a short (12 minutes + 3 minutes for questions) PowerPoint presentation communicating their proposal ideas (10%). This exercise will provide one final round of peer feedback on proposal ideas before the final proposal is due, and an opportunity to gain additional public speaking experience.

Labs

Oral & Written Skills in Science - An introduction to public speaking and proposal writing skills with in-depth discussion of the research proposal project and group exercises to view and assess example proposals (contribution to professionalism grade).

VHF Radio Telemetry Practical Exercise – In groups, students will locate VHF radio transmitters hidden around Dalhousie campus using hand-held antennas and receivers. Lab write-up assignment will apply triangulation methods and address advantages and limitations of this technique (write-up 7.5% + contribution to professionalism grade).

Vemco Acoustic Telemetry Practical Exercise - Students will learn about available acoustic telemetry products from the world leaders in the field, Vemco. Lab exercises will include a mock-experiment with real-time data download from receivers and an introduction to data processing and analysis using custom software (contribution to professionalism grade).

Biologging Science In The Media - Students will watch two short documentaries on shark tagging research, followed by a discussion of the pros and cons of integrating biologging science and the media (contribution to professionalism grade).

Device Attachment Considerations – Seabird Case Studies - Students will consider tag attachment approaches for a variety of tag types and study species of seabirds using specimens in the Thomas McCulloch Museum and real device examples. Assignment will address important considerations, advantages and limitations of a chosen attachment technique for a target species (write-up 7.5% + contribution to professionalism grade).

Introduction to ArcGIS for visual aids in biologging research proposals – Over the course of two sessions, students will learn the basic skills necessary to produce maps and plot geospatial data in ArcGIS. Assignment will require producing a map relevant to your proposed research for inclusion in the final proposal (proposal map 5% + contribution to professionalism grade).

Class & University Policies

To avoid any misunderstanding throughout the semester, please note the following policies and information will be enforced by the instructor to ensure transparent, fair and equal treatment for all. Extenuating circumstances are inevitable and you are encouraged to communicate with your instructor if you have any issues or require special consideration at any time during the semester. These procedures are in accordance with and/or in addition to the relevant sections in the current University Calendar. If there is any discrepancy, the University Calendar will take precedence.

Assignments and Grading

All assignments should be typed, well written and spell-checked before submission. To maximize your mark, please use care in ensuring all required components as listed in the assignment instructions or rubric have been met to the very best of your ability. Although most assignments will have a detailed point distribution for marking, the instructor and TA have discretionary power to deduct additional points (up to 20%) for overall sloppy writing, poor grammar and spelling, inadequate referencing, glaring omissions, and general inferior quality of the assignment.

Any material submitted for evaluation after the designated deadline will have marks **DEDUCTED AT THE RATE OF 10% PER DAY LATE** (Monday-Friday). The stress that results from procrastinating on the completion of assignments is avoidable. There will be times during your term when you will have deadlines in several different courses at the same time. **PLAN AHEAD & WORK SYSTEMATICALLY.** Your time at Dalhousie should serve to teach you effective time management skills.

Extensions without a late penalty will be given only with a valid (medical or otherwise) excuse. If you need an extension for an assignment, communicate with the instructor.

The following is the policy on illness and other extenuating excuses for extensions:

- a) A student who misses class work because of illness notifies the instructor on or before the day in question, notifies his/her physician at the time of illness, and provides a medical certificate, signed by a physician, within one week of the date missed;
- b) A student who, for medical reasons (e.g. scheduled day surgery, physiotherapy, etc.), anticipates missing class work notifies the instructor at least one week in advance;
- c) A student who is absent due to other exceptional circumstances notifies the instructor on or before the day in question, and is willing to produce appropriate documentation upon request.

Do not assume that presenting a medical excuse sometime after your missed class work will ensure that alternate arrangements will be made unless you had previously notified the instructor with appropriate advance and discussed the situation. Unforeseen events such as personal/family crises or illness can occur during the term. These occurrences are unavoidable and your instructor will be understanding and willing to make alternate arrangements.

Most lectures will be made available on the class website just before the lecture for the convenience of the students. These files will not constitute all of the material given in lecture. There will be considerable additional information, explanation and group discussion in class that is not posted. It is crucial to attend lectures so that you leave this course with the intended learning outcomes and achieve your best possible grade.

Accommodation Policy

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

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.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale:

A+ (90-100)

A (85-89)

A- (80-84)

B+ (77-79)

B (73-76)

B- (70-72)

C+ (65-69)

C (60-64)

C- (55-59)

D (50-54)

F (<50)