

---

**Syllabus for BIOL/MARI 4323 “Biologging in Ecology”****Department of Biology, Dalhousie University****Instructor: Sarah E. Gutowsky, sarahegutowsky@gmail.com****Lectures (Tues/Thurs 1005-1125) & Labs (Tues 1435-1725): LSC 2102**

---

**Overview:**

With rapid technological advances over recent years, studies of the spatial ecology, behaviour and ecophysiology of wildlife have expanded to include telemetry (remote measurement of biologically relevant data) and archival logging (capture of such data by a system that requires retrieval for data access) as solutions to 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 (including both telemetry and archival approaches). 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, critter-cams, 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 technologies, ethical and study design considerations, and introducing students to current statistical analysis techniques, data processing tools and visualization software.

**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 methods and explain their applications, advantages and limitations.
3. Understand the ethical considerations that should be incorporated into the design of any biologging study.
4. Analyze and display a variety of biologging data using multiple statistical techniques and data processing tools.
5. 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.

## Tentative Course Calendar:

Week - Day	Topic	Deliverables
1 – Tues	Course overview & introduction to Biologging	
1 – Tues	NO LAB	
1 – Thur	Introduction to geospatial data	
2 – Tues	Uses of geospatial data	
2 – Tues	Lab 1 - Research Proposal Writing & Public Speaking Skills	
2 – Thur	Linking Biologging & the environment	
3 – Tues	Foraging Ecology & Biologging	
3 – Tues	Lab 2 – Science in the Media - Shark Documentaries	
3 – Thur	Ethical considerations in Biologging	
4 – Tues	Guest - VHF-based telemetry – Dr. Rob Ronconi	Speaker Qs
4 - Tues	Lab 3 - VHF tracking exercise with Rob Ronconi	
4 - Thur	Ecophysiology & Biologging	Lab 3
5 - Tues	Guest – Acoustic Telemetry - Lee Gutowsky	Speaker Qs
5 - Tues	Lab 4 – Fish Acoustic Tagging with Lee Gutowsky	
5 - Thur	“Today in Tagging” Presentations	
6 - Tues	Guest - Squid Accelerometry – Dr. Ron O’Dor	Sp. Qs & Outline
6 - Tues	Lab 5 – Seabird considerations in device attachment	
6 - Thur	Guest – Penguin Physiology – Dr. Glenn Crossin	Sp. Qs & Lab 5
8 – Tues	Guest – VEMCO manufacturer’s perspective	Speaker Qs
8 - Tues	Lab 6 - Practical applications with VEMCO	
8 - Thur	Guest – Seals, Turtles & CritterCams – Susan Heaslip	Speaker Qs
9 - Tues	Guest – Lotek manufacturer’s perspective	Speaker Qs
9 - Tues	Lab 7 – Practical Applications with Lotek	
9 - Thur	Subjectivity in Biologging science	Pro Draft
10 – Tues	Guest – Spatial Data Analysis – Ian Jonsen	Speaker Qs
10 - Tues	NO LAB – work on proposals	
10 - Thur	Guest - Collaboration - Sara Iverson	Sp. Qs & Review
11 - Tues	Guest – Law & Policy - David VanderZwaag	Speaker Qs
11 - Tues	Lab 8 - Feedback on proposal progress - 2.5 weeks until Due	
11 – Thur	Lecture Catch-up and/or Recap	
12 – Tues	Proposal Presentations	
12 – Tues	Lab 9 - Intro to ArcGIS for maps and data visualization 1	
12 – Thur	Proposal Presentations	
13 – Tues	Proposal Presentations	
13 – Tues	Lab 10 - Intro to ArcGIS for maps and data visualization 2	
13 – Thur	Proposal Presentations	Lab 10
14	Final Research Proposal Due	Final Proposal

---

**Student Evaluation:**

Class Participation .....	20%	Research Proposal Outline.....	5%
Lab Write-Ups .....	20%	Proposal Peer Review.....	10%
“Today in Tagging” .....	5%	Proposal Presentation.....	10%
		Final Research Proposal.....	30%

---

**Class Participation in Guest Lecture Series = 20%**

A major highlight of this course will be a guest lecture series from specialists in biologging, to provide the most topical information possible on the current state of science and technology in this field. The success of this series relies heavily on student engagement. Students will be expected to attend and actively participate at all guest lectures. Links to guest speaker websites and recent publications will be provided and students are expected to come prepared with at least one question for each speaker from these resources and any others sought independently (“Speaker Q’s under calendar deliverables). **These questions will be submitted before the speaker begins; up to 2%/speaker.** Further marks can be deducted at the Instructor’s discretion for lack of attendance or participation in any lecture or lab exercises.

**“Today in Tagging” Presentation = 5%**

In assigned pairs of 2, students will prepare a short (8 minutes maximum) PowerPoint presentation summarizing a recent marine biologging study (publication year 2011-present). This exercise serves three purposes: (1) To expose students to the greatest variety of tracking science applications beyond the planned course content, (2) To give students an opportunity to hone visual presentation and oral communication skills, and (3) to illustrate the necessity of working with colleagues, most often not by choice. Presentations will take place in lectures and at the start of some labs; dates and groups will be assigned after the first lecture. Content elements will summarize: study system, questions, hypothesis(es) and predictions, methods, results, conclusions and future research directions. Students will get to watch a video recording of their presentation (and will need to do so to receive full marks). \*Disclaimer: All lectures 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 behaviour, ecology and/or ecophysiology using any combination of biotelemetric or archival logging 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 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 in Week 6 and returned with feedback before the Winter Break, followed by a full draft for peer review in Week 9, peer review completed by Week 10, and the final paper in Week 14. The students will also have the opportunity to present a short (8 minutes maximum) PowerPoint presentation communicating their proposal ideas. This exercise will provide one final round of peer and instructor feedback on proposal ideas before the final proposal is due, and an opportunity to gain additional oral presentation experience.

---

**Lab Exercises = 20% (5% x 4 Lab Write-ups: Labs 3, 4, 5 & 10)**

---

**Lab 1 – Important Skills in Science: Oral Presentations and Proposals**

An introduction to public speaking and proposal writing with discussion of the research proposal project and exercise to view and assess example proposals.

**Lab 2 – Science for Science vs. Science for Media - Documentary Viewing**

Students will watch two short documentaries on shark tagging research, followed by a discussion of the pros and cons of integrating science and media. Live Q&A with an Environment Canada scientist featured in one of the documentaries will enhance the discussion.

**Lab 3 - VHF radio exercise with Rob Ronconi**

Students will locate VHF radio transmitters hidden around Dalhousie campus using hand-held antennas and receivers. Assignment will apply triangulation methods and address advantages and limitations of this technique.

**Lab 4 – Acoustic tagging in Fish with Lee Gutowsky**

Students will gain hands-on experience with mock surgical procedures for acoustic tag implantation into fish, guided by an expert in the field. Suture technique and attention to sterilization will be assessed, and evaluation will take place in-class.

**Lab 5 - Tag attachment considerations – seabird case studies**

Students will consider tag attachment approaches for a variety of tag types and study species of seabirds. Assignment will address important considerations, advantages and limitations of a chosen attachment technique.

**Lab 6 & 7 - Practical Applications with VEMCO & Lotek**

Students will learn about custom software for processing data directly from the tag manufacturers.

**Lab 8** - Instructor available for feedback on proposal project progress and proposal peer reviews will be returned.

**Lab 9 & 10 - Introduction to ArcGIS for spatial data visualization**

Students will learn the basic skills necessary to produce maps and plot geospatial data in ArcGIS. Assignments will require producing a map from a mock dataset.

## Class Policies & Other Important Information

---

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 has 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.

### **Academic Misconduct**

Please review the Dalhousie University procedures and policies concerning Academic Integrity at: [http://www.dal.ca/dept/university\\_secretariat/academic-integrity.html](http://www.dal.ca/dept/university_secretariat/academic-integrity.html)

All work submitted for this course is to be done individually unless a group effort is specifically indicated by the instructor. The instructor reserves the right to request your assignments be submitted both in paper and electronically so that Safe Assign can be used to minimize the potential for academic dishonesty.

Plagiarism is a particularly serious offence. The university-sanctioned definition is as follows: "Dalhousie University defines plagiarism as the presentation of the work of another author in such a way as to give one's reader reason to think it to be one's own. Plagiarism is a form of academic fraud. Plagiarism is considered a serious academic offence, which may lead to loss of credit, suspension or expulsion from the University, or even the revocation of a degree."

The instructor of this class is obligated to report any suspected cases of plagiarism to the Academic Integrity Officer of the Faculty of Science.