Introduction to Animal Bioacoustics (FW599 & OC599)

Credits: 3
Instructors:
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See also: www.bioacoustics.us

Requirements:
Textbook (print or ebook):

Companion website: http://sites.sinauer.com/animalcommunication2e/

Software:
Matlab™ (student license) available at mathworks.com.

Textbook Information: NOTE: For textbook accuracy, please check the textbook list at the OSU Bookstore website (http://osubeaverstore.com/). Sample syllabi may not have the most up to date textbook information!

Course Content:
Animal bioacoustics, often called simply bioacoustics, is the study of sound in non-human animals. The course will provide an introduction to marine and terrestrial animal bioacoustics covering principles of animal acoustic communication; sound production mechanisms; sound reception mechanisms; evolution of sound production and hearing mechanisms; effects of acoustic propagation on natural sounds; sound detection, classification, localization and tracking; estimating populations and population density; impact of human-generated noise on animals.

Each sub-discipline within the scope of bioacoustics has opened up exciting new areas of inquiry. Bioacoustics is also highly interdisciplinary. An aspiring professional typically needs to be proficient at one field and familiar with several others. Bioacousticians work in a variety of positions - as professors at universities, as consultants working in environmental compliance, as industrial researchers, as engineers. Many are employed in research at public and private institutions. Many more work at private companies,
particularly (in the U.S.) on environmental compliance and mitigation issues.

The course consists of lectures and assignments. Lectures will cover the following topics:

**Introduction to Sound (Weeks 1-2)**

*Topics:* Course overview and logistics, areas of bioacoustic research and applications, careers in bioacoustics. The modality of sound communication, the nature of sound, characterization of sounds.

*Outcomes:* Summarize careers in bioacoustics and the background needed for each. Assess how amplitude, frequency, and other physical characteristics of sound waves affect animal sound signaling.

*Assessment:* Quiz and group discussion.

**Sound Recording and Analysis (Weeks 3-4)**

*Topics:* Recording equipment and methods. Tools for analysis of animal vocalizations.

*Outcomes:* Record, view, measure, and describe animal sounds qualitatively and quantitatively. Automatically detect animal sounds in a recording.

*Assessment:* Homework (record and analyze data) followed by group discussion. Begin planning of final project.

**Source-Medium-Receiver Theory of Communication (Weeks 5-6)**

*Topics:* Sound signal generation (animal sound production, modification and coupling of sound signals, balancing amplification and efficiency); sound propagation (overall attenuation, frequency pattern distortion, temporal pattern distortion, noise masking); sound reception (coupling between medium and receiver, modification of captured sound signals, detection and analysis of received sound signals, body size and sound).

*Outcomes:* Describe mechanisms of animal sound production and the manner in which sound is coupled to the transmission medium. Summarize ways that sound propagation and the acoustic environment can impact animal sound reception and evaluate their impacts on communication.

*Assessments:* Quiz, group discussion.
Animal Behavior and Acoustic Communication (Weeks 7-10)

Topics: Mate attraction and courtship (male and female reproductive strategies, sexual selection, sexually selected traits and signaling, courtship); social integration (general principles of recognition, male-female integration, parent-offspring integration, group integration); environmental signals (the diversity of environmental signals, predator deterrent signals, alarm signals, feeding signals, autocommunication/echolocation).

Outcomes: Summarize the ways in which acoustic communication is used to mediate reproductive and non-reproductive behavior. Evaluate the impacts of natural and manmade noise on communication.

Assessment: Homework (case study of acoustic communication in a chosen species) and group discussion.

Final Project

Objectives: The objectives of the final project are [a] to design and conduct a bioacoustics experiment, [b] to describe and evaluate the outcomes of the study, and [c] to summarize your study in a scientific conference poster.

Timeline: A final project proposal is due by end of week 6. The final project (narrated PowerPoint poster presentation) needs to be submitted by end of week 10.

Assessment: Project proposal, poster, oral presentation.

Learning Resources:

This course will be delivered via Blackboard where students will interact with each other and the instructor. Within the course Blackboard site, students will access outside readings, acoustic datasets, and the syllabus; discuss issues; submit assignments; email other students and the instructor; and participate in online activities. Students should expect instructors to reply to questions, emails, and assignments within 48 hours.

Evaluation of Student Performance:

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<tr>
<th>Component</th>
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<tr>
<td>Quizzes</td>
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<td>Discussions</td>
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<td>Final Project</td>
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Quizzes will be a combination of multiple choice, matching, fill-in the blank, true/false, short answer, and essay questions. Exam material will be based on cumulative lecture content, discussion topics, and reading assignments.
Grading Scale:

Final grades will be based on straight percent of the total possible score. We will use the following scale: A 92-100; A- 90-91 B+ 88-89; B 82-87; B- 80-81; C+ 78-79; C 72-77; C- 70-71; D+ 68-69; D 62-67; D- 60-61; F < 60.

Students with Disabilities:

Accommodations are collaborative efforts between students, faculty and Disability Access Services (DAS). Students with accommodations approved through DAS are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through DAS should contact DAS immediately at 541-737-4098.

Expectations for Student Conduct:

All students are expected to comply with the regulations pertaining to academic honesty detailed in the Oregon University System, Student Conduct Code. Students will be expected to treat all others with the same respect as they would want afforded themselves. Students also are expected to conduct themselves in the all aspects of the course (for example, email discussion boards) university's regulations regarding civility.

See also: http://oregonstate.edu/studentconduct/regulations/index.php

Course evaluation:

Students are encouraged to engage in the online course evaluation process. The evaluation form will be available toward the end of each term, and you will be sent instructions through ONID. You will login to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.