

BIONB4200: Methods and Principles in Bioacoustics

“Many of the animal tribe have signals to express their various passions, wants and feelings... all species are not equally eloquent, but no animal is quite mute” – Adapted, Gilbert White, 1778

Course description: Animals live in a world of sound. In ecosystems around the planet, acoustic signals serve many functions, from mediating social interactions to helping find elusive prey. This hands-on, multidisciplinary course will introduce students to the principles of bioacoustics and methods used to answer questions in this field.

The course will consist in part of lectures and discussions, during which students will participate in an in-depth exploration of the physical properties of sound. Each class meeting will be highly interactive and rely on student participation and discussion. As part of the class, students will learn to think and act as professional scientists. Arrive to class ready to contribute to intellectual conversations and interact with the material, the instructors, and your peers.

Course Outcomes: After completing this course you will:

- Be able to describe the main over-arching principles of bioacoustics.
- Be able to explain how animals in different ecosystems produce and receive sound.
- Be able to generate hypotheses for how acoustic signals and other animal behaviors evolve.
- Gain experience with techniques for analyzing natural sounds and explain their practical uses.

Class meetings: T 10:10am-12:05pm. Mudd W364, Start: 2 Feb, End: 10 May 2016.

<i>Instructors</i>	<i>Office hours</i>	<i>Phone</i>	<i>Email</i>
Dr. Jenélle Dowling	Th 1:30-3:30, W307 Mudd	717.891.1506	jld276@cornell.edu
Dr. Aaron Rice	After class/by appt. (campus or CLO)	607.254.2178	arice@cornell.edu

Online material: Website: <http://tinyurl.com/bionb4200>, Password: bioacoustics

Discussion board: piazza.com/cornell/spring2016/bionb4200

Readings: Scientific papers and select chapters from various texts (we will provide pdfs). We occasionally send links to articles, videos and Cornell seminars on bioacoustics. Incorporate what you learn into discussions or writing (e.g., Piazza, paper summaries, responses, etc.) for extra credit.

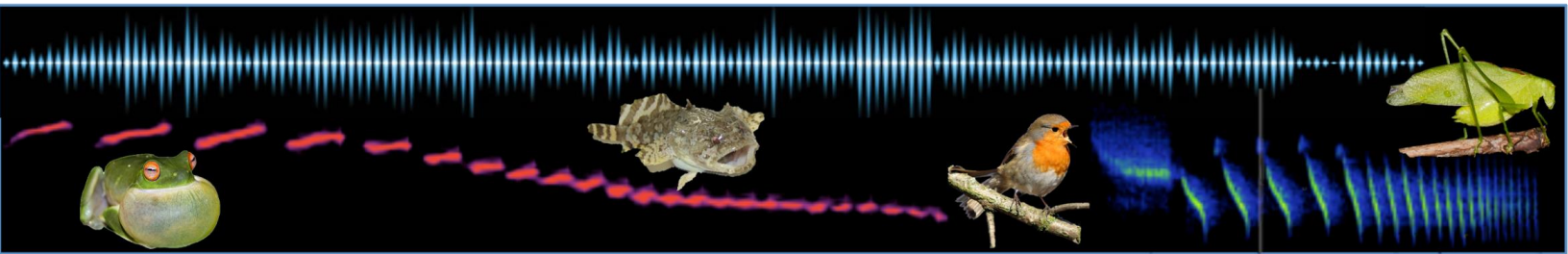
Pre-class assignments: We will use Piazza for assignments and discussion (link above). Assignments based on each week’s reading are posted a week in advance and are **due each Monday night by 11:59pm**. For technical problems accessing/interacting with the site, [contact Piazza](#).

Attendance: We will excuse one late arrival and one absence without penalty. You will lose participation points for additional unapproved lateness and absence. If you’re never late/absent, you’ll get extra credit.

Grading: Participation and discussion (60% of grade) - You can demonstrate your understanding of course concepts through pre-class Piazza assignments and in-class discussions.

Final paper (30% of grade) - Write up of group research paper (your entire team will receive the same grade to make sure everyone contributes equally)

Final presentation (10% of grade) - 30 min presentation on group research project (you will be graded individually, based on the content you present and your answers during Q&A).



How to do well: 1) Check course webpage each week, complete Piazza assignments before Monday. 2) Share your questions/thoughts on topics from reading during discussions. 3) Allow time to plan, conduct and write-up final project. 4) Talk to us often and share ideas about research project early.

Classroom culture: Everyone comes to acoustics with different experiences and perspectives, and one is not better than others. In our course, you can share thoughts and questions freely, and we will respond respectfully. We promote a supportive atmosphere of mutual respect and professionalism.

Course policies: Students are held to Cornell's academic integrity code. Academic dishonesty of any kind, including plagiarism, will not be tolerated. See: <http://cuinfo.cornell.edu/aic.cfm>

Date	Class Topic(s)	Lab Exercises	Assignments Due (every Monday)
February 2	<ul style="list-style-type: none"> • Course Intro/Overview • Overview of web resources • Active bioacoustics research topics 		<ul style="list-style-type: none"> • Pre-course survey • Sign up for course on piazza • Read/skim Brennan paper
2/16- Break February 9	<ul style="list-style-type: none"> • Basics of acoustical physics 	<ul style="list-style-type: none"> • Acoustic demo • Group problem solving 	<ul style="list-style-type: none"> • Piazza response to Krause TED talk
February 23	<ul style="list-style-type: none"> • Evolution of animal sounds 	<ul style="list-style-type: none"> • Introduction to sound analysis tools 	<ul style="list-style-type: none"> • Group problem solving • Start coming up with project teams
March 1	<ul style="list-style-type: none"> • Biomechanics of sound production and perception 	<ul style="list-style-type: none"> • Quantitative sound analysis 	<ul style="list-style-type: none"> • Piazza response to Bass & Clark 2003 or Wiley & Richards 1978
March 8	<ul style="list-style-type: none"> • Soundscape ecology 	<ul style="list-style-type: none"> • Group problem solving • Form project teams 	<ul style="list-style-type: none"> • Piazza response to Pijanowski et al. 2011
March 15	<ul style="list-style-type: none"> • Intro to acoustic data collection and analysis 	<ul style="list-style-type: none"> • Proposal feedback 	<ul style="list-style-type: none"> • Piazza response to Blumstein et al. 2011 or Van Parijs et al. 2009
March 22	<ul style="list-style-type: none"> • Real-world applications of bioacoustics 	<ul style="list-style-type: none"> • Discuss data collection and management • Intro to box.com 	<ul style="list-style-type: none"> • Piazza response to Bradbury 1999 • Project experimental design/data collection plan
3/29- Break April 5	<ul style="list-style-type: none"> • Policy implications related to bioacoustics 	<ul style="list-style-type: none"> • Work on projects 	<ul style="list-style-type: none"> • Piazza response to Smith & Pijanowski 2014
April 12	<ul style="list-style-type: none"> • Sound and medicine/human health 	<ul style="list-style-type: none"> • Work on projects 	<ul style="list-style-type: none"> • Piazza response to NPR Story and Blumstein et al. 2010
April 19	<ul style="list-style-type: none"> • Music in the Context of Acoustic Communication 	<ul style="list-style-type: none"> • Work on projects 	<ul style="list-style-type: none"> • Piazza response to Gray et al. 2001 and McDermott 2008
April 26	<ul style="list-style-type: none"> • Project feedback/troubleshooting 	<ul style="list-style-type: none"> • Work on projects 	
May 3-10	<ul style="list-style-type: none"> • Presentations 		<ul style="list-style-type: none"> • Final paper due by 11:59pm, 5/13

Study Period: May 12-15, Finals: May 16-19 (no final for this course)