

## **BIOSC 1445 Animal Communication**

**Course Info:** Lectures - Tuesdays and Thursdays, 4-5:15 pm, A224 Langley, 3 credits

**Instructor:** Dr. Nathan Morehouse, 223 Clapp Hall, [nim@pitt.edu](mailto:nim@pitt.edu), (412) 624-3378

**Office Hours:** Wednesday, 1:30-3:30 pm or by appointment via email

**Prerequisites:** C or better in BIOSC 0370 Ecology.

### **A. Course Objective**

Communication is a fundamental process in the lives of animals that influences nearly all aspects of their biology, from the developmental coordination of complex sensory organs to choices regarding mating partner identity. This course is explicitly integrative in approach, covering topics ranging from the neurobiology of signal production and reception to game-theoretic understandings of the evolution of communication networks.

The course begins by introducing students to how animals produce and receive signals using sound, light, chemicals, mechanical pressure and electricity. Students then consider how such signals evolve by considering questions of optimality, decision making, information theory and economics. The course then approaches topical issues related to the contexts in which signals are used, including aggression and dominance, mate attraction and courtship, cooperation and social signaling, and foraging. The course concludes with theoretical consideration of communication and social networks, followed by a brief overview of how animal communication fits within the broader context of biological signaling across taxa (microbes, plants, humans, etc.).

### **B. Organization of Course Content**

The course is designed to meet twice a week for 75 minutes, totaling 150 minutes of in-class instruction per week. This time will be composed of a mix of traditional lecture-style presentation of course content, interspersed with group exercises and thought problems. Students will also be expected to periodically read primary scientific literature and summarize its content.

Week 1: Signals and Communication

Week 2: Sound and Sound Production

Week 3: Sound Signal Propagation and Reception

Week 4: Light and Visual Signal Production

Week 5: Visual Signal Propagation and Reception

Week 6: Chemical Signals

Week 7: Short Range Modalities: Touch, Mechano- and Electroreception

Week 8: Decisions, Signals and Information

Week 9: The Economics of Communication

Week 10: Signal Evolution

Week 11: Conflict Resolution

Week 12: Mate Attraction and Courtship

Week 13: Social Integration and Communication Networks

Week 14: The Broader View: Microbes, Plants and Humans

## C. Course Requirements

### 1. Required text and materials

*Principles of Animal Communication*, 2<sup>nd</sup> Ed., by J.W. Bradbury and S.L. Vehrencamp, Sinauer Associates, 2011.

Available at the bookstore, or online as hardcover (\$87) or eBook (\$46) through the publisher (<http://www.sinauer.com/detail.php?id=0456>).

*i>clicker*

Available at the bookstore. This will be used in every class, and points associated with it constitute 20% of the course grade. All models of the i>clicker (standard, 2 and +) should work.

### 2. Literature reviews

Five times over the course of the semester, students will be required to summarize the major findings a primary literature article selected from a list of acceptable journal articles provided by the instructor. Each summary must be less than 1 page single-spaced, and include a brief explanation of the broader topic, the research approach, the most significant findings, and their importance. Students are encouraged to work in groups to discuss and understand the material in the papers, but must write their summaries individually.

### 3. i>Clicker questions

Student progress will be assessed in-class using a student response system (“i>clickers”) to thought exercises and group work. Students who forget their i>clicker for a given class will not be eligible for that day’s i>clicker points even if they can answer the questions correctly in person or in writing. Students who are absent cannot make up these points. Over the course of the semester, more i>clicker points will be available than are required to achieve a full score for this aspect of grading, so points lost to the occasional low battery, i>clicker failure or other technical difficulty should not impact a student’s grade in the course.

### 4. Exams

The course exam schedule will consist of two mid-term exams (February 19<sup>th</sup> and April 11<sup>th</sup>) and a final exam (date TBA).

### 5. Approximate time spent outside of class

In addition to time in lecture, students should expect to spend 8-10 hours per week outside of class working on readings, literature reviews and exam preparation.

## D. Grading Policy:

### 1. Relative weight of each requirement

In-Class Participation (i>clicker points): 200 points

Literature Summaries (5): 200 points

Mid-Term Exam 1: 200 points

Mid-Term Exam 2: 200 points

Final Exam: 200 points

Total Points: 1,000

### 2. Policy on late work and make-ups

There will be no make ups for points lost due to missing course lectures because more points will be offered than used in calculating the final score. Grades on assignments will devalue by 10% each day late. For exams, student absences will be considered on a case by case basis and must be for reasons outside of their control (e.g. illness, death in the family, etc.). Relevant documentation must be provided. Should written documentation be deemed sufficient to excuse the exam absence, students will be allowed to make up the exams orally with the course instructor.

## E. i>Clickers

In every lecture, students will be asked to answer questions using their i>clicker. For each question, students will be given 2 points for participating, and an additional ½ point for answering correctly. i>clickers will be used beginning the first day of class, but will not count towards the course grade until after the Add/Drop period ends on January 18<sup>th</sup>. On average, 10 i>clicker points will be available in each lecture, with a guaranteed 8 points for each student who answers all i>clicker questions. At the end of the term, these points will constitute the “In-Class Participation” portion of the grade. i>clicker points will be scaled to a total of 210 possible points out of 200. This means that students will not be penalized for missing one class or for technical difficulties with their i>clickers, so long as those difficulties are resolved quickly.

It is the student’s responsibility to make sure that their i>clicker is registered, working correctly, and has sufficient battery power to last through the current class. If a student loses or breaks their i>clicker, it is their responsibility to replace it prior to the subsequent class, register it, and report to the instructor that their i>clicker identity has changed.

REGISTER YOUR I>CLICKER. Please register your device online (<http://www.iclicker.com/support/registeryourclicker/>). You must use your Pitt User ID (the part of your email address that precedes @pitt.edu). Please do not use your PeopleSoft or Pitt Card ID number when you register. If you don’t register under your Pitt User ID, you will not receive credit for your i>clicker points. Check to make sure that your i>clicker is properly registered and working by checking that points are being recorded on CourseWeb. You should be able to see these points prior to Add/Drop, although they will not count until afterwards.

PUT YOUR NAME ON YOUR I>CLICKER. These devices are easy to get confused with ones from other students/friends.

DO NOT GIVE YOUR I>CLICKER TO A FRIEND. Cheating with i>clickers will not be tolerated. Any student caught entering answers using multiple i>clickers will lose their i>clicker and all associated i>clicker points for the remainder of the term, as will the students who own the other i>clickers. In addition, all students involved will be reported to the Dean's office for a violation of academic integrity.

#### **F. Classroom Etiquette**

Lecture time is dedicated to learning and discussing the scientific principles of animal communication. This means that all outside conversations and commitments should be set aside during class time. Students wishing to take notes using their laptops are encouraged to do so in a way that minimizes distraction to fellow students. Students found using their laptops to play games, check Facebook or surf the Internet for topics unrelated to the course will be politely asked to leave. All mobile phones should be turned off or set to silent mode and put away prior to the start of lecture. The use of cell phones during class is prohibited, including texting, except as expressly permitted by the instructor. Students who arrive late or leave early should do so as quietly as possible, and may be subject to heckling by the instructor. Please plan to arrive on time and stay the entire class period.

#### **G. Disability Resources**

If you have a disability for which you are, or may be, requesting an accommodation, you are encouraged to contact both the instructor for this course and the Office of Disability Resources and Services, 216 William Pitt Union, 412-648-7890/412-383-7355 (TTY), as early as possible in the term. Disability Resources and Services will verify your disability and determine reasonable accommodations for this course.

#### **H. Academic Integrity Policy**

Cheating/plagiarism will not be tolerated. Students suspected of violating the University of Pittsburgh Policy on Academic Integrity (<http://www.as.pitt.edu/faculty/policy/integrity.html>) will be required to participate in the outlined procedural process as initiated by the instructor. A minimum sanction of a zero score for the quiz, exam, or paper will be imposed.

#### **I. E-mail Communication Policy**

Each student is issued a University e-mail address ([username@pitt.edu](mailto:username@pitt.edu)) upon admittance. This e-mail address may be used by the University for official communication with students. Students are expected to read e-mail sent to this account on a regular basis. Failure to read and react to University communications in a timely manner does not absolve the student from knowing and complying with the content of the communications. The University provides an e-mail forwarding service that allows students to read their e-mail via other service providers (e.g., Hotmail, AOL, Yahoo). Students that choose to forward their e-mail from their pitt.edu address to another address do so at their own risk. If e-mail is lost as a result of forwarding, it does not absolve the student from responding to official communications sent to their University e-mail

address. To forward e-mail sent to your University account, go to <http://accounts.pitt.edu>, log into your account, click on 'Edit Forwarding Addresses', and follow the instructions on the page. Be sure to log out of your account when you have finished.

Please take a professional approach to your email use. It is good practice for life post-graduation, and will get you a faster reply. If you are unsure about how to email professors, consult this useful guide: <http://www.wikihow.com/Email-a-Professor>

#### **J. Turnitin**

Students agree that by taking this course all required assignments may be subject to submission for textual similarity review to [Turnitin.com](http://Turnitin.com) for the detection of plagiarism. All submitted papers will be included as source documents in the [Turnitin.com](http://Turnitin.com) reference database solely for the purpose of detecting plagiarism of such papers. Use of [Turnitin.com](http://Turnitin.com) page service is subject to the Usage Policy and Privacy Pledge posted on the [Turnitin.com](http://Turnitin.com) site.

#### **K. Office Hours**

Office hours will be set each term; they will be listed in the syllabus, on CourseWeb, and on the office door. Students may also make individual appointments.

*The integrity of the academic process requires fair and impartial evaluation on the part of faculty and honest academic conduct on the part of students. To this end, students are expected to conduct themselves at a high level of responsibility in the fulfillment of the course of their study. It is the corresponding responsibility of faculty to make clear to students those standards by which students will be evaluated, and the resources permissible for use by students during the course of their study and evaluation. The educational process is perceived as a joint faculty-student enterprise which will perforce involve professional judgment by faculty and may involve—without penalty—reasoned exception by students to the data or views offered by faculty. Senate Committee on Tenure and Academic Freedom, February 1974*

Lecture Date	Topic	Reading/Assignment
January 8	Signals & Communication I	Ch. 1
January 10	Signals & Communication II	Ch. 1
January 15	Sound & Sound Production I	Ch. 2
January 17	Sound & Sound Production II	Ch. 2
January 22	Sound Signal Propagation & Reception I	Ch. 3
January 24	Sound Signal Propagation & Reception II	Ch. 3; Lit. Review 1 Due
January 29	Light & Visual Signal Production I	Ch. 4
January 31	Light & Visual Signal Production II	Ch. 4
February 5	Visual Signal Propagation & Reception I	Ch. 5
February 7	Visual Signal Propagation & Reception II	Ch. 5
February 12	Chemical Signals I	Ch. 6; Lit. Review 2 Due
February 14	Chemical Signals II	Ch. 6
February 19	MID-TERM EXAM I	
February 21	Short Range Modalities: Touch, Mechano- & Electroreception	Ch. 7
February 26	Decisions, Signals & Information I	Ch. 8
February 28	Decisions, Signals & Information II	Ch. 8
March 5	The Economics of Communication I	Ch. 9; Lit. Review 3 Due
March 7	The Economics of Communication II	Ch. 9
March 19	Signal Evolution I	Ch. 10
March 21	Signal Evolution II	Ch. 10
March 26	Conflict Resolution I	Ch. 11
March 28	Conflict Resolution II	Ch. 11
April 2	Mate Attraction & Courtship I	Ch. 12; Lit. Review 4 Due
April 4	Mate Attraction & Courtship II	Ch. 12
April 9	MID-TERM EXAM II	
April 11	Social Integration & Communication Networks	Ch. 13 & 15
April 16	Environmental Signals	Ch. 14
April 18	The Broader View: Microbes, Plants & Humans	Ch. 16; Lit. Review 5 Due
April XX	FINAL EXAM	