

NEURAL BASIS OF COMMUNICATION (NSCI467-010)

Fall 2018 Syllabus

Class time: Tuesday & Thursday, 9:30-10:45 p.m.

Class location: Purnell Hall Room 331

Contact Information:

Instructor: Dr. Josh Neunuebel

Office location: Wolf 114

Office hours: Tuesday & Thursday from 8:15-9:15 a.m. and by appointment

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Course description:

Communication is a fundamental component of our daily lives and this process depends on our ability to transmit and detect auditory signals. In this introductory course, we will delve into various aspects of social communication. The course has an interdisciplinary nature and will address interesting questions related to the neural basis of signal detection and processing, the aspects of the signals to which receivers respond, and the evolutionary mechanisms that have shaped communication.

Readings:

We will be reading journal articles. Articles are available for download on Canvas Course Site under the Resources/Papers tab.

An optional text will be Principles of Animal Communication, the 2nd edition by Bradbury & Vehrencamp.

Format of the class:

In addition to expanding your knowledge base, the course is designed to develop your academic skills. Therefore, class will be broken up into four different activities, each designed to develop specific skills while exploring the neural basis of communication. First, you will read articles from the primary literature and write discussion questions for the readings. Second, you will participate in class discussions. Third, in groups of 5 or 6, you will do a class presentation, teaching the other students about an area related to the neural basis of communication. Finally, you will take quizzes designed to test your understanding of the material taught by the other students. Each of those areas is outlined in more detail below.

Discussion questions:

Beginning the second week of class, each student will be required to turn in four questions for each week. The questions should relate to the readings for that week. The purpose of the questions is threefold. First, handing in questions (and participating in discussion) will be the only ways I can be sure you are doing the readings. Second, thinking of questions will encourage you to read the material carefully and develop your skills of evaluating, understanding, and applying information. Finally, the questions you supply may be used to facilitate discussion. Questions are due by 10 pm on Sunday before the week of the classes in which the readings will be discussed. They should be uploaded to the Canvas Course Site under the assignment tab. Late questions will not be accepted (unless accompanied by a doctor's note).

Participation in discussion:

On days in which we discuss the readings, each member of the class should contribute to every discussion. Students can earn up to 3 points during each discussion by describing parts of the paper or answering questions asked by the professor or a classmate. Each time a student responds, they

will receive 1 point. A student who does not contribute at all to the discussion on a given day will receive a 0 for their participation grade for the day.

Presentations to the class:

Groups of 5-6 people will present an area of interest to the rest of the class. You will do a 30-45 minute power point presentation to the class, teaching them about your topic. To prepare for the presentation, you will do readings in your area and discuss them as a group. You will also provide students in the class with an outline to help them study for the quiz. The outline should follow the structure of your lecture so that students can follow along while you present. Each student will also write 3 quiz questions (multiple choice), which will be used to help write the quizzes. The outline and questions will be due the day *before* your presentation at 8 am. The outline and questions will be uploaded to the Sakai Course Site under the assignment tab.

Quizzes:

Quizzes will occur at the end of class after each student presentation. All students will be required to take the quiz—even the students presenting the material.

Grading:

Break down of point value

Paper Discussions: 27 points (3 per discussion)

Discussion Questions: 27 points (3 per assignment)

Presentation: 20 points

Quizzes: 20 points (each quiz is 5 points)

Your course grade will be based on a total of 94 points. The final course grades are based on the stringent cutoffs listed below.

<u>Grades</u>	<u>Points</u>
A	≥89.30
A-	≥84.60
B+	≥81.78
B	≥78.02
B-	≥75.20
C+	≥72.38
C	≥68.62
C-	≥65.80
D+	≥62.98
D	≥59.22
D-	≥56.40
F	<56.40

Attendance:

We have a limited time in which to cover a lot of material. Therefore, if you miss a class you will have two points deducted from your final grade unless you write a short (1 to 2 page) reaction paper to the readings. The purpose of the reaction paper will be to ensure that you have done on your own the work that we will be doing in class. The reaction paper should focus on your reactions to the readings. Did you agree with the theories? What did you find interesting? Can you relate the readings to anything else? Reaction papers are due within one week of the missed class and will be worth up to 3 points (the amount deducted for missing a class). You cannot write a reaction paper if you did not miss a class (i.e. for extra credit). Writing a reaction paper does not excuse you from writing discussion questions.

Classroom courtesy:

You have heard this before, but please turn off all cell phones and never, never text. Please do not leave class for a period of time and then return unless you have alerted me first. If you are ill, please take your belongings and do not return until the next class.

Notice to persons with disabilities:

University of Delaware adheres to all applicable federal, state, and local laws, regulations, and guidelines with respect to providing reasonable accommodations for students with disabilities. If you have a disability that may adversely affect your work in this class, then I encourage you to register with the Office of Disability Support Services (DSS) and to talk with me about how I can best help you. All disclosures of disabilities will be kept strictly confidential. Note that no accommodation can be made until you register with the Counseling Center.

Student absences on religious holidays:

The University of Delaware requires that an instructor excuse a student from attending classes or other required activities, including examinations, for the observance of a religious holiday, including travel for that purpose. A student whose absence is excused under this policy may not be penalized for that absence and shall be allowed to take an examination or complete an assignment from which the student is excused within a reasonable time after the absence.

Absences on religious holidays not listed in University calendars, as well as absences due to athletic participation or other extracurricular activities in which students are official representatives of the University, shall be recognized as excused absences when the student informs the instructor in writing during the first two weeks of the semester of these planned absences for the semester. The instructor will complete a form notifying the student of a reasonable timeframe in which the missed assignments and/or examinations are to be completed.

Visitors in the classroom:

Unannounced visitors to class must present a current, official University of Delaware identification card to be permitted in the classroom. They must not present a disruption to the class by their attendance. If the visitor is not a registered student, it is at the instructor's discretion whether or not the visitor will be allowed to remain in the classroom.

Policy on academic dishonesty:

All students are expected to engage in all academic pursuits in a manner that is above reproach. Students are expected to maintain complete honesty and integrity in the academic experiences both in and out of the classroom. Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action. The University and its official representatives may initiate disciplinary proceedings against a student accused of any form of academic dishonesty including, but not limited to, cheating on an examination or other academic work which is to be submitted, plagiarism, collusion and the abuse of resource materials. The penalty for academic dishonesty in this course is an "F".

For more information, please visit (<http://www.udel.edu/stuguide/15-16/code.html>).

Schedule:

Tuesday		Thursday	
8/28/18	Intro	8/30/18	General Discussion
9/4/18	Topic 1 - Paper 1/2 Discussion	9/6/18	Topic 1 - Paper 1/2 Discussion
9/12/18	Topic 2 - Paper 3/4 Discussion	9/14/18	Topic 2 - Paper 3/4 Discussion
9/18/18	Topic 3 - Paper 5/6 Discussion	9/20/18	Topic 3 - Paper 5/6 Discussion
9/25/18	Topic 4 - Paper 7/8 Discussion	9/27/18	Topic 4 - Paper 7/8 Discussion
10/2/18	Topic 5 - Paper 9/10 Discussion	10/4/18	Topic 5 - Paper 9/10 Discussion
10/9/18	Topic 6 - Paper 11/12 Discussion	10/11/18	Topic 6 - Paper 11/12 Discussion
10/16/18	Topic 7 - Paper 13/14 Discussion	10/18/18	Topic 7 - Paper 13/14 Discussion
10/23/18	Work on Class Presentation	10/25/18	Work on Class Presentation
10/30/18	Topic 8 - Paper 15/16 Discussion	11/1/18	Topic 8 - Paper 15/16 Discussion
11/6/18	Election Day-No Class	11/8/18	Work on Class Presentation
11/13/18	Topic 9/10 - Paper 19/20 Discussion	11/15/18	Topic 9/10 - Paper 19/20 Discussion
11/20/18	No class	11/22/18	No class
11/27/18	Class Presentation	11/29/18	Class Presentation
12/4/18	Class Presentation	12/6/18	Class Presentation

Topics:

Topic 1	Signals and Communication
Topic 2	Sound and Sound Signal Production
Topic 3	Sound Signal Propagation and Reception
Topic 4	Decisions, Signals, and Information
Topic 5	The Economics of Communication
Topic 6	Signal Evolution
Topic 7	Conflict Resolution
Topic 8	Mate Attraction and Courtship
Topic 9	Social Integration
Topic 10	Communication Networks

Papers:

1. Topic 1- Signals and Communication
 - a. Bradbury, J. W. and S. L. Vehrencamp. 2000. Economic models of animal communication. *Animal Behaviour* 59: 259–268.
 - b. Hasson, O. 1997. Towards a general theory of biological signaling. *Journal of Theoretical Biology* 185: 139–156.
2. Topic 2- Sound and Sound Signal Production
 - a. Au, W. W. L. and K. Banks. 1998. The acoustics of the snapping shrimp *Synalpheus parneomeris* in Kaneohe Bay. *Journal of the Acoustical Society of America* 103: 41–47.
 - b. Bennet-Clark, H. C. 1999. Resonators in insect sound production: How insects produce loud pure-tone songs. *Journal of Experimental Biology* 202: 3347–3357.
3. Topic 3 - Sound Signal Propagation and Reception
 - a. Brown, T. J. and P. Handford. 2003. Why birds sing at dawn: the role of consistent song transmission. *Ibis* 145: 120–129.

- b. Brumm, H., K. Voss, I. Kollmer, and D. Todt. 2004. Acoustic communication in noise: regulation of call characteristics in a New World monkey. *Journal of Experimental Biology* 207: 443–448.
- 4. Topic 4 - Decisions, Signals, and Information
 - a. Illes, A. E., Hall, M. L., & Vehrencamp, S. L. 2006. Vocal performance influences male receiver response in the banded wren. *Proceedings. Biological Sciences / The Royal Society*, 273(1596), 1907–1912.
 - b. Bee, M. A., S. A. Perrill, and P. C. Owen. 2000. Male green frogs lower the pitch of acoustic signals in defense of territories: a possible dishonest signal of size? *Behavioral Ecology* 11: 169–177.
- 5. Topic 5 - The Economics of Communication
 - a. Bass, A. H., E. H. Gilland, and R. Baker. 2008. Evolutionary origins for social vocalization in a vertebrate hindbrain-spinal compartment. *Science* 321: 417–421.
 - b. Meitzen, J., D. J. Perkel, and E. A. Brenowitz. 2007. Seasonal changes in intrinsic electrophysiological activity of song control neurons in wild song sparrows. *Journal of Comparative Physiology a-Neuroethology Sensory Neural and Behavioral Physiology* 193: 677–683.
- 6. Topic 6 - Signal Evolution
 - a. Tibbetts, E. A. and A. Izzo. 2010. Social punishment of dishonest signalers caused by mismatch between signal and behavior. *Current Biology* 20: 1637–1640.
 - b. Ryan, M. J. 1998. Sexual selection, receiver biases, and the evolution of sex differences. *Science* 281: 1999–2003.
- 7. Topic 7 - Conflict Resolution
 - a. Zakon, H. H. and K. D. Dunlap. 1999. Sex steroids and communication signals in electric fish: a tale of two species. *Brain, Behavior and Evolution* 54: 61–69.
 - b. Stevenson, P. A., V. Dyakonova, J. Rillich, and K. Schildberger. 2005. Octopamine and experience-dependent modulation of aggression in crickets. *Journal of Neuroscience* 25: 1431–1441.
- 8. Topic 8 - Mate Attraction and Courtship
 - a. Stowers, L., Holy, T. Meister, M., Dulac C., and Koentges G. 2002. Loss of Sex Discrimination and Male-Male Aggression in Mice Deficient for TRP2. *Science* 2002 Feb 22;295(5559):1493-500.
 - b. Laberge, F., R. C. Feldhoff, P. W. Feldhoff, and L. D. Houck. 2008. Courtship pheromone-induced c-Fos-like immunolabeling in the female salamander brain. *Neuroscience* 151: 329–339.
- 9. Topic 9 - Social Integration
 - a. Keverne, E. B., N. D. Martensz, and B. Tuite. 1989. Beta-endorphin concentrations in cerebrospinal fluid of monkeys are influenced by grooming relationships. *Psychoneuroendocrinology* 14: 155–161.
 - b. Cheng, M. F., J. P. Peng, and P. Johnson. 1998. Hypothalamic neurons preferentially respond to female nest coo stimulation: demonstration of direct acoustic stimulation of luteinizing hormone release. *Journal of Neuroscience* 18: 5477–5489.
- 10. Topic 10 - Communication Networks
 - a. Sueur, C. and O. Petit. 2008. Shared or unshared consensus decision in macaques? *Behavioural Processes* 78: 84–92.
 - b. Sumpter, D. J. T. 2006. The principles of collective animal behaviour. *Philosophical Transactions of the Royal Society B-Biological Sciences* 361: 5–22.