

Attention!

This is a *representative* syllabus.

The syllabus for the course when you enroll may be **different**.

Use the syllabus provided **by your instructor** for the most up-to-date information. Please refer to your instructor for more information for the specific requirements for a given quarter.

EEOB 632: The Neurobiology of Animal Behavior

Spring 2012

Instructor: William M. (Mitch) Masters

Department of Evolution, Ecology, and Organismal Biology

Phone: 292-4602

Email: masters.2@osu.edu

Office: 240c Jennings

Office hours: by arrangement (please see me in class or email me to so we can find a time)

Graduate Teaching Assistant: Heather Fair, Ph.D. candidate

Department of Evolution, Ecology, and Organismal Biology

Email: fair.10@buckeyemail.osu.edu

Office: 494 Aronoff Laboratory

Office hours: Thursdays 3:00-4:00, Fridays 11:00-12:00

Website: We will make extensive use of Carmen for course information. In fact, essentially all course information should be available on this site, and you ought to check it reasonably often. We will try to email everyone if we post something that is urgent or late. Please use the discussion board on this site for queries you think are of general interest to the class. For problems or questions not of general interest, just email Heather or me directly.

Textbook: There is no textbook for this course, but several books are on reserve in the BPL library. These are Peter Simmons and David Young (1999) *Nerve Cells and Animal Behavior*, Thomas J. Carew (2000) *Behavioral Neurobiology: The Cellular Organization of Natural Behavior*, and Günther K.H. Zupanc (2004) *Behavioral Neurobiology: An Integrative Approach*.

Course Description: EEOB 632 is an introduction to the field referred to as neuroethology or behavioral neurobiology. As a distinct scientific discipline this field has emerged relatively recently from a combination of ethology (the study of animal behavior in an adaptive context), and neurobiology (the study of nervous systems). The goal of neuroethology is to understand behavior from sensory input through neural processing to behavioral output. This full goal has, in a few instances, actually been achieved, but often we know only part of the story (or even, for many animals, none at all). Neuroethologists, as opposed to neurophysiologists in general, place a high value on trying to understand behavior in its natural context, so even their laboratory experiments are often designed to mimic natural conditions as closely as possible. Behavioral neurobiology requires integration of information from sensory physiology, neurophysiology, information processing, motor systems, evolution, ecology, and development.

Course Goals: The principal goals of this course are to (1) learn some of the history of neuroethology, (2) to understand more about the sensory world of different animals, (3) to understand the basic events in neural information processing and transmission, and (4) to examine several classic neuroethological model systems. This last goal will be accomplished by

reading articles that will be posted on Carmen ahead of time. Note that this course is NOT devoted solely to neurons and the nervous system, subjects that are covered by other courses in the university in much greater detail.

My Personal Biases: I like physics and I like mathematics (both up to a point). I'm not as much a fan of chemistry. (I'm not proud of this, and I do recognize the importance of chemistry.) Thus, in this course I often lean toward explanations based on elementary physics, and to a lesser extent mathematics, because that's the way my brain seems to work. The physics of electricity (because we will be talking about neurons) and sound (because I've spent my research career studying sound and vibration) will feature prominently in this course. I realize not everyone's brain works like mine (as my wife keeps telling me), so if you really dislike physics, this may not be the course for you.

Course Plan: In past years I've tried to integrate discussion of the nervous system in parallel with readings of neuroethological case studies. My intent was to maintain student interest, but the course came across, I admit, as rather schizophrenic. I've decided this time to go for bipolar rather than schizophrenic. After a brief introduction to the history of neuroethology at the start of the course, we will cover the nervous system (see goal 3 above) before turning to case studies. I expect we'll spend about 3 weeks on the nervous system and the remainder of the time on case studies.

Course Format: The course meets for three 48-minute periods each week. Lectures will be presented in "question" format, meaning that I will post a number of questions for the lecture on Carmen before class, and then we will go over those questions in class. When we discuss articles, I will, just as for lectures, post questions on Carmen to accompany each article. Test material will be based on the questions I post for the lectures and articles (including, of course, the related in-class discussion of these questions).

Course Topics and Readings: At the end of this syllabus there is a list of topics I plan to cover (bearing in mind that this schedule may require modification as we go). Prof. Doug Nelson, Director of the Borror Laboratory of Bioacoustics, will be a guest instructor during the second half of the quarter. He will talk about how song birds learn their songs, which is similar in many ways to how humans learn language.

Where You Can Accumulate Points: There will be exams every other week on Friday, starting the second Friday of the course. The first four of these exams will be worth 50 points and should take no more than half an hour. Each will cover the material since the preceding exam. The fifth and final exam will be worth 100 points and will take an hour. It will cover the whole course, with emphasis on the last two weeks. If the class median is below 80% on these exams, we will add points to bring it up to this value. In addition to exams, we will have a one-question quiz on every reading assignment on the day we start discussion of that assignment. (Obviously, this is to encourage you to actually read the assignment before we start to discuss it.) Each of these quizzes will be worth 10 points, and we will drop the lowest one. We will also, at irregular intervals but probably often, have in-class assignments that you turn in immediately, each worth 5 points. Again, we will drop the lowest one. These in-class assignments will "formative assessments" rather than tests, and are intended to help me know whether I have managed to

make the material we are covering clear or not. Lastly, each person will turn in two research article synopses, each worth 30 points (see next item). These writeups will be peer-reviewed by two people before being turned in, with reviewers getting up to 10 points per review. The total number of points in the course should be in the neighborhood of 500. Your grade in the course will be based on the percentage of points you accumulated, according to the standard OSU grade scale (93-100% = A, 90-93% = A-, 87-90% = B+, 83-87% = B, etc.).

Research Article Synopses: Each student will write two reports, each worth 30 points, on an article from the primary literature. Each report should be an 800- to 1200-word synopsis (about 2 pages) of a peer-reviewed RESEARCH article (NOT a review article) that is relevant to this course. Heather and I will select a few pre-approved articles for you to use if you wish. You may also select your own articles to review, in which case you must get them approved by either Heather or me before you turn in your synopsis. The idea of these reports is not so much a critical review (i.e., what the authors should have done, or limitations on the applicability of their results, etc.) as simply a report of what they did. You should make clear why the experiment was done (historical context, or question being addressed), as well as what was learned, and what still remains to be learned or where the research will go from here. It should be possible to glean all these things from the article itself, so multiple references are not necessarily required. You may not have space in only 1200 words to cover everything in the article, in which case we ask (a) that whatever you do cover be covered clearly and well, and (b) that you make clear that you are not summarizing the entire article. Please provide us either with a PDF of the article you review or the URL of the article, unless it is one of the pre-approved articles..

If you wish to choose your own articles to review, then please select relevant articles from the following journals: *Journal of Comparative Physiology A*, *Journal of Experimental Biology*, *Journal of Neurophysiology*, *Animal Behaviour*, *Ethology*, *Behavioral Ecology*, *Behavioral Ecology and Sociobiology*, *Science*, or *Nature*. All of these journals can be accessed for free via the OSU library. (Be sure to sign in if you are using an off-campus computer.) Again, please obtain permission to use the article before writing up a synopsis.

Research reports will be graded primarily on intelligibility and accuracy (can we understand what you wrote, and is it accurate?), with 5 points reserved for writing style (grammar, organization, spelling, etc.). Prior to submission, your writeup will be reviewed anonymously by two of your fellow students. (You will likewise serve as a reviewer of two writeups.) You will rate each reviewer's helpfulness on a scale of 1-10, and these points will go to the reviewers. Everything you turn in must be in your own work. You should not use extensive direct quotes from the article; in fact, you should not even use short direct quotes unless there is a very good reason for doing so. Everything you turn in must be written by you and by you alone. Do NOT, we beg of you, plagiarize anyone else's work (see the warning on academic misconduct below).

Your first drafts of your research article writeups will be due at the start of class on Friday in the fourth and seventh weeks of the quarter, with the final draft due a week later. The penalty for late submission of either the draft or the final version is 10%/day.

Extra credit: You can write one extra-credit synopsis of a research paper following the same guidelines as for the regular research reports, except that the word count should be in the range of 400-600 words. An extra-credit paper can add 1% to your total grade.

Policy on makeups: I expect people to attend class, but there may be times when you have a legitimate (and documented!) reason for missing, generally a reason involving factors beyond your control. If you miss, or plan to miss, a class, particularly if there will be an exam or quiz, please contact me as soon as you can. Do not assume that an excuse that seems reasonable to you will seem reasonable to me. My principal concern is fairness to everybody. Unless there are specific circumstances warranting an exception (and this must be okayed by me *in advance*), all makeups must be completed within a week of the missed test. In-class assignments cannot be made up. If you have a documented excuse for missing one of these, we will give you a score for the missed assignment that is the average of your scores on your other in-class assignments.

Students with Disabilities: Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately to discuss specific needs. I rely on the Office for Disability Services in room 150 Pomerene Hall, 1760 Neil Avenue, to arrange reasonable accommodations for students with disabilities. You may contact the Office at 292-3304, TDD 292-0901, or at <http://www.ods.ohio-state.edu/>. If you have trouble accessing any class-related materials, please contact me immediately by phone or email.

Academic Misconduct: It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed, illustrated by – but not limited to – cases of plagiarism and dishonest practices in connection with examinations. I will report all instances of alleged academic misconduct to the Committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/info_for_students/csc.asp).

Anticipated Course Schedule

Note: this schedule is tentative and may change as we go. I often find that my course plans are overly optimistic.

01	Mar 26 M		Intro to course
02	Mar 28 W	History	Ethology and Neuroethology
03	Mar 30 F	Nervous system 1	The resting membrane potential
04	Apr 02 M		
05	Apr 04 W	Nervous system 2	Graded and action potentials
06	Apr 06 F		Midterm 1
07	Apr 09 M	Nervous system 3	Synapses
08	Apr 11 W		
09	Apr 13 F	Nervous system 4	Speed of neural propagation
10	Apr 16 M		
11	Apr 18 W	Article	Roeder: Moths and ultrasound
12	Apr 20 F		Midterm 2; Rough draft of first article due at start of class
13	Apr 23 M	Article	Bullock: Seeing the world through a new sense
14	Apr 25 W		
15	Apr 27 F		Wehner: 'Matched filters' – Neural models of the external world, First article due by start of class
16	Apr 30 M	Article	Konishi: Listening with two ears
17	May 02 W		
18	May 04 F		Midterm 3
19	May 07 M	Dr. Doug Nelson	Bird song learning
20	May 09 W		
21	May 11 F		Rough draft of second article due at start of class
22	May 14 M	Article	Owl prey capture by sound
23	May 16 W		
24	May 18 F		.Midterm 4, Second article due by start of class
25	May 21 M		Bat sonar: FM and CF bats
26	May 23 W	Article	Suga: Biosonar and neural computation in bats
27	May 25 F		
28	May 28 M	No class	Memorial Day
29	May 30 W		
30	Jun 01 F		Midterm 5
	Jun 05 T		Final 1:30 - 3:18 pm