PSY/BIO 5080 Cellular Basis of Animal Behavior, Winter 2018

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OPENING NOTE: This syllabus, by specifying the rules and procedures of this course, helps me to treat students fairly and impartially. Your decision to remain enrolled in the class indicates that you agree to follow these rules.

I. Course Overview

The objective of this course is to gain an understanding of the nervous system by exploring the types of neural mechanisms particular animals evolved to solve problems posed to them by their environment. We will explore the world of *Neuroethology*, a field of research that studies the neural basis of animal behavior under naturalistic conditions. Our goal is to gain an appreciation of the richness of animal behavior, as well as the intricacy and complexity of the underlying neural systems that mediate this behavior. My goal is to provide students with an overview and general understanding of the current knowledge in this field. This knowledge will serve you well as a basis for understanding complex behavior from simple organisms to humans. I also hope is that you come to understand and appreciate the connection between Psychology and Biology, as well as to other life and physical sciences.

II. Course Materials and Learning Resources

Course site: We will be using the Canvas platform: https://canvas.wayne.edu/courses/31935

Required materials: All required readings will be posted on Canvas. These assigned readings are also listed in the course schedule.

Recommended text: *Behavioral Neurobiology* by Thomas J. Carew. Sinauer Press, 2001.

This course is based on one developed at Yale University by Dr. Thomas J Carew, for which the book was written. It is an older book, and if you search you should be able to find an inexpensive copy. Much of what we discuss in the class will be based on material from the book (table of contents here), which will be supplemented with discussions of more recent research during lecture. The book will often present course material in a more approachable way than what is in the assigned readings.

Additional Instruction: If you would like individual help on the material, please take advantage of office hours. *I am happy to meet with you by appointment*. Take advantage of these opportunities! Your instructors should be viewed as resources in the learning process, and it is to your benefit to use these resources to your best advantage.

Study Habits and Asking Questions in Class: It will be to your advantage to keep up with your reading assignments; you should read the assigned reading before lecture. Additionally, you will find it immensely helpful to review your lecture notes prior to the following lecture. If there is something you don't understand, feel free to ask questions. It is likely that others may have the same question, and they will be thankful (as I will be) that you spoke up to clarify a point. I will allow a few minutes before each lecture to answer questions on previous material.

Copies of lecture overheads (in .pdf format) will be posted on the course web site prior to lecture. They are provided in order to help you follow lectures, and to help you organize your notes. **Lecture overheads provided on the course web site are not meant to be a substitute for attending lecture.** There will be a good deal of information added to this content during lecture. If you choose to not attend lecture and rely on the posted overheads, you would have chosen poorly.

III. Examinations

There are three examinations, each covering only those lectures in that section. Examinations are based both on lectures and the material in the assigned readings. The exams will consist of a combination of multiple choice and short essay questions. Each exam is worth 100 points.

In fairness to all students, only under the *specific* circumstances listed below will make-up exams be considered. **You must notify me prior to the exam that you will be absent.** There may be an emergency not listed that may be allowable. However, you should not assume that an emergency as defined by you will be considered similarly by me. You still need to contact me **in advance** of the exam, and you will be expected to provide credible documentation. My contact information is listed on the first page of the syllabus.

All make-up exams must be completed within 2 working days of the scheduled exam (by Monday for Thursday exams, by Thursday for Tuesday exams). Any extension of this time must be approved in advance.

Allowable excuses for make-up exams:

1) Participating in a University-approved athletic event or performance (music, dance, debate, etc.). You must let me know of the event at least one week before the exam, and you must provide documentation of the function from the coach, coordinator, etc.

2) You have a religious holiday that requires that you not attend class at the time of the exam. You must let me know of the holiday at least one week before the exam.

3) You are ill and can prove it. You must be able to provide a doctor's note dated the day of the exam. You must also let me know of the illness no later than the morning of the exam.

4) A funeral occurs on the day of the exam. You must bring a note from the funeral home indicating your attendance at the funeral.

IV. Term paper

All students are required to prepare a term paper which counts for 75 points towards your final grade. Specific details for completing the assignment are provided on a separate document posted on the course Canvas site, *Instructions for Completing the Term Paper*.

In this exercise, you will write a term paper that is at least 10 pages long (2500 words) In keeping with the spirit of the course, your paper will focus on the neural basis of animal behavior, using a similar strategy as the textbook. There will be two components to your paper: (1) A description of the behavior by discussing original (peer-reviewed) research; and (2) a description of the neural mechanisms that underlie this behavior, again by discussing original (peer-reviewed) research. Criteria for evaluating papers are provided in the instructions. You should read this procedure as soon as possible; understanding the grading criteria will be valuable to you as you prepare your paper.

Why are we doing this?

- This exercise will require you to explore the scientific basis behind the subject matter that is covered in this course. By reading and summarizing original research articles, you will learn about the types of methods people use to explore the cellular basis of behavior, the types of data researchers obtain, and the conclusions they draw from their findings.
- Writing effectively is one of the most important skills you need to develop in college. Writing original papers based on empirical research is a critical skill; it requires that you are able to search a literature, pick out relevant and credible sources, and summarize them effectively. Like any skill, ***practice*** is the only way to improve.

Term paper timeline:

	Step	Deadline (11:59 PM)	Points
1	Complete *Plagiarism Module*	Tuesday January 23	
2	Prospectus submitted AND approved	Tuesday February 6	15
3	Submit paper	Thursday April 5	60

***Please note that these deadlines are ABSOLUTE**: there will be no extension for any reason*

V. Grading

Your grade will be determined based upon a total of 400 points; 300 points from the exams, 25 points from the *Neuron Basics* quiz, and 75 points from your term paper. There is **no extra credit** available in this course. Grades are determined by the total points accumulated, and will be assigned as in the table below. There will be **no exceptions** to this grading scale.

To calculate your points, I will replace your lowest exam score with the average of all three exam scores. This will help if you have one poor exam performance.

Grade	Percent*	Points	Grade	Percent*	Points
A	100 - 94	400 - 374	C	76 - 73	305 - 290
A-	93 - 90	373 - 358	C-	72 - 70	289 - 278
B+	89- 87	357 - 346	D+	69 - 67	277 - 266
B	86 - 83	345 - 330	D	66 - 63	265 - 250
B-	82 - 80	329 - 318	D-	62 - 60	249 - 238
C+	79 - 77	317 - 306	F	59 and below	237 and below

Withdrawals

This course follows all official university policies regulating course withdrawals. Key information is provided below, and can also be found at http://reg.wayne.edu/students/information.php#dropping

Students must **drop** classes by logging into Academica. You can drop the class with full tuition cancellation through the first two weeks of the term. If drop the class by the end of the fourth week of class, the course will not appear on your transcript.

Beginning the fifth week of class students are no longer allowed to drop but must withdraw from classes. Students must initiate the request by logging into Pipeline (view a "how-to" video here). It is the student's responsibility to request the withdrawal. The withdrawal period ends at the end of the tenth week of the term. For Winter Term 2018 **the deadline is Sunday, March 25**. A complete list of important dates regarding course withdrawal can be found on the University's Academic Calendar.

Before withdrawing from a course, you will need to perform a **SMART Check** to learn how withdrawing will specifically impact you financially and academically. Click here for more information.

VI. Classroom Courtesy

In any class, even small disruptions can quickly turn into major ones. If it is disturbing and/or distracting to me, you can assume that it is also disruptive for your fellow classmates. Therefore we will adhere to the following code of conduct:

1. Late arrival should be an exception. If you are late, sit closest to where you entered so as not to disturb the class.

2. Early departure should be an exception. It would be polite if you informed your instructor beforehand.

3. Turn cell phones off, and refrain from looking at them. Facebook, Twitter etc. can wait.

4. Talking will disturb those who actually wish to hear the lectures. If you have a question, please ask your instructor, not your neighbor.

Disruptive individuals will be asked to leave the classroom. Significant and repeated violations of courteous classroom behavior may result in the involved student's dismissal from this course.

VII. Important information on cheating and plagiarism

Both cheating and plagiarism are considered to be serious academic offenses that will result in disciplinary action. Below are summaries defining each. Please note: students are responsible for reading and understanding the University policy on student ethics as set forth in the Wayne State University *Undergraduate Bulletin* and the *Student Code of Conduct.*

Cheating during exams: Copying from another student, or allowing another student to copy from you, are both considered cheating. Using unauthorized material or devices (books, notes, all electronic devices) is prohibited. Communication between students is also prohibited. If you have any questions during an exam, you should only ask your instructor.

Plagiarism is the act of presenting as your own work another individual's ideas, words, data, or research material. *This includes altering the language, paraphrasing, omitting, and rearranging words to make them appear as your own*. This applies equally to written, spoken, or electronic texts, published or unpublished. All ideas and quotations that you borrow from any source must be acknowledged. At a minimum, you should give the name of your author, the title of the text cited (or URL of web page), and the page number(s) of the citation (if applicable). You should know that penalties for plagiarism are severe and can entail suspension from the University. If you have any questions on what might constitute plagiarism, see me! It is better to ask and be safe (as well as honest), then to run the risk of committing academic fraud.

To ensure that you understand what plagiarism is, I have created an *Academic Integrity Module* on the course Canvas site. This is a brief tutorial exercise that will ensure you understand what plagiarism is and how to avoid it. Successful completion of this exercise is required. Please note that you must answer all questions in the module exercise correctly in order to pass the exercise. If you have not passed the exercise by the deadline, you will not be allowed to submit a term paper, and you will automatically lose 75 course points from the term paper exercise.

Your only warning:

Please be aware that all work handed in to me will be checked to ensure that the work is your own. It is not difficult to detect cheating and plagiarism, and I will report all cases to the to the WSU Student Conduct Officer. At a minimum, you will receive a zero for any fraudulent work. Depending on the severity of the offense, I reserve the right to assign a failing grade in the course. The Student Conduct Officer may take additional action, ranging from a notification of academic fraud in your academic records to expulsion from the university.

III. Lecture Schedule

This schedule is subject to change depending on how we progress through the material. Assigned papers are posted on Canvas.

	Dates	Topic and assigned readings	Carew book
1	T Jan 9 TH Jan 19 T Jan 16	**Neuroethology: Neurons to behavior** Chapters from Neuroscience OnLine • Introduction to Neurons and neural networks • Chapter 1: Resting potentials and action potentials • Ch. 6: Synaptic transmission • Ch. 7 Synaptic plasticity Neuron Basics quiz: 25 points (administered in class 1/18)	Chapter 1
2	TH Jan 18 T Jan 23 TH Jan 25	**Echolocation in bats** • Biosonar and neural computation in bats. Suga N. *Scientific American,* 262: 60-8, 1990 • What the bat's voice tells the bat's brain. N Ulanovsky and C. F. Moss. *Proceedings of the National Academy of Science USA,* 105: 8491-8498, 2008	Chapter 2
3	T Jan 30 TH Feb 1 T Feb 6	**Prey location in owls** • Mechanisms of Sound Localization in the Barn Owl (*Tyto alba*). Knudsen E. and Konishi M. *Journal of Comparative Physiology,* 133: 13 - 21, 1979 • Instructed learning in the auditory localization pathway of the barn owl. Knudsen, E. *Nature,* 417: 322-8, 2002.	Chapter 3
	TH Feb 8	**Exam 1**	
		Section 2	
4	T Feb 13 TH Feb 15 T Feb 20	**Reflex regulation in crayfish** • Fifty years of a command neuron: the neurobiology of escape behavior in the crayfish. Edwards, D. H., Heitler, W. J., & Krasne, F. B. *Trends in Neurosciences*, 22: 153–161, 1999. • Serotonin, social status and aggression. Edwards, D. H., & Kravitz, E. A. *Current Opinion in Neurobiology*, 7: 812–819, 1997 • The Structural Basis of an Innate Behavioural Pattern. Wine, J. *The Journal of Experimental Biology*, 112: 283–319, 1984.	Chapter 7

5	TH Feb 22 T Feb 27 TH Mar 1	**Birdsong** • Neural mechanisms of birdsong memory. Bolhuis, J. J., & Gahr, M. *Nature Reviews Neuroscience*, 7: 347–357, 2006 • Song learning: the interface between behaviour and neuroethology. Marler, P. *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences*, 329: 109–114, 1990	Chapter 8
6	T Mar 6 TH Mar 8 *Mar 13 &15* ☀ T Mar 20	**Foraging in honeybees** • Learning and memory in the honeybee. Hammer, M., & Menzel, R. *Journal of Neuroscience*, 15: 1617–1630, 1995. • The honeybee as a model for understanding the basis of cognition. Menzel, R. *Nature Reviews Neuroscience*, 13: 758–768, 2012	Chapter 9
	TH Mar 22	**Exam 2**	
		Section 3	
7	T Mar 27 TH Mar 29	**Molecular basis of learning in *Aplysia*** • The Molecular Biology of Memory Storage: A Dialogue between Genes and Synapses. Kandel, E. R. *Science*, 294: 1030–1038, 2001 • Molecular mechanisms underlying a unique intermediate phase of memory in *Aplysia*. Sutton, M. A., Masters, S. E., Bagnall, M. W., & Carew, T. J. *Neuron*, 31: 143–154, 2001.	Chapter 10
8	T Apr 3 TH Apr 5	**Genetics of learning in *Drosophila*** • Genetic Dissection of Consolidated Memory in *Drosophila*. Tully, T., Preat, T., Boynton, S. C., & Delvecchio, M. *Cell*, 79: 35–47, 1994. • Targeting the CREB pathway for memory enhancers. Tully, T., Bourtchouladze, R., Scott, R., & Tallman, J. *Nature Reviews Drug Discovery*, 2: 267–277, 2003.	Chapter 11
9	T Apr 10 TH Apr 12 T Apr 17	**Spatial navigation in rats** • A Brief History of Long-Term Potentiation. Nicoll, R. A. *Neuron*, 93: 281–290, 2017. • Plasticity, hippocampal place cells, and cognitive maps. Shapiro, M. *Archives of Neurology*, 58: 874–881, 2001.	Chapter 12
	TH Apr 19	***Flex day:*** *used for scheduling flexibility in case of weather cancellations, slow progress, etc. If not needed, we will not meet*	
	TH Apr 26	**Exam 3 (same room; exam starts at 12:30 PM)**	