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PSYX 571.01: Advanced Physiological Psychology

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PSYX 571 – Advanced Physiological Psychology

Fall 2018

Monday & Friday 9:30 am – 10:50 am
Room location: SB 301

Contact Information

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Office hours: Skaggs Rm 362, Mon. & Tues. 2:30-3:30 pm or by appointment

Course Description

In this course we will be examining the physiological basis of behavior. Where many psychology classes focus on "What do humans and other animals do?" we will be asking "*How* is it done?" This requires thinking about what the physiological **parts** of a behaving system do and how they interact with one-another. In other words, we will be discussing the **mechanisms** of behavior.

This field is *vast* and, relative to many areas of science, our understanding is still *primitive* and incomplete. It is vast in part because the system can be broken down into parts in many different ways, at many levels. It is also vast because human behavior has a breadth and depth that exceeds any other system we know of, ranging from simple reflexes to nuanced expressions built from memories, expectations, emotions, hormonal cycles, etc. Therefore, the goal is not for you to walk away from this class with an understanding of how the nervous system works, but for you to ***build enough basic knowledge of the system, and the process of its investigation, that you can critically evaluate research in this field***. If we all do our jobs right, you may even walk away from this class with creative, testable ideas about mechanisms within your own specialization of psychology.

The course will be primarily lecture based, but there will additionally be 10 discussions, approximately 30 min. long, taking place on before some of the lectures. Discussion will be led by an assigned student and center on an assigned article related to the previous-week's topic.

Enumerated learning outcomes can be found on the last page of the syllabus.

Reading Material

First (and foremost): read, understand, and think about your lecture notes. This also means you should take good notes during lecture and ask questions about concepts that are unclear. This also means you should attend every class.

Second: Each week I will be assigning a new reading from the literature that relates to the week's topic. There will a 30 minute discussion period on these readings on the days specified in the course outline.

Third: If you are looking for more background to flesh-out the topics presented in class, one useful resource is a free online textbook (https://nba.uth.tmc.edu/neuroscience/). This book will help answer questions you might have and hopefully will give you more questions that can be used for class discussion.

Course Evaluation

In this course, you will be evaluated by two term tests (each worth 22.5% of your final grade) one cumulative final exam (30% of your final grade), and discussion (25% of grade, as described below). Each test will be based on lecture material. They will typically contain multiple choice and written response questions. The final exam will be take-home and made-up of several essay questions.

Discussion grades: Each discussion session will have a leader who will be responsible for a brief (< 5 min) overview of the reading(s) and for moderating the discussion. The discussion leader role will be worth 30% of your discussion grade (7.5% of total grade). Those not leading the discussion will be responsible for emailing me and the discussion leader one or two questions about the readings BEFORE the day of discussion. Questions will be marked as "full-credit", "half-credit", or "no credit" depending on whether they address the importance, implications, or problems of the science presented by a given article. Your participation during the discussion will likewise be marked as "full", "half", or "none." Your total mark for the reading/discussion will be the MAXIMUM of written and oral discussion marks. So, if you send meaningful questions that receive full credit, you will receive full points for the discussion even without actively participating. Likewise, if the questions you wrote are not meaningful, but in discussion you help articulate the importance, implications, or problems of the science presented by the article, you will receive full credit. There are a total of 10 discussion days, so 70% of your discussion grade (17.5% of total) will be based on the 9 credits you receive as a non-discussion leader.

Course Policies

Drop Date

See the University's Drop/Add Policy. Beginning the 46th instructional day of the semester through the last day of instruction before scheduled examinations, students must petition to drop.

Academic Misconduct

All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code.

Disability Modifications

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and Disability Services for Students If you think you may have a disability adversely affecting your academic performance, and you have not already registered with Disability Services, please contact Disability Services in Lommasson Center 154 or call 406.243.2243. I will work you and Disability Services to provide an appropriate modification.

Makeup Tests

If you have to miss a scheduled test, please contact me before the test to discuss the situation. *There will be **NO** makeup tests*, and if there are compelling circumstances beyond your control that require you to miss a test, the weighting of that test will be redistributed to the other tests.

Please note that this outline is subject to change depending on the needs of the class. Any changes to the syllabus will be announced in class beforehand. The assignment and test dates are fixed.

Course Outline

Date	Topics	Assigned reading
Aug. 27th & 31st	1) Goals of physiological psychology and overview of the nervous system	Yoshihara & Yoshihara, 2018 (topic: inferring causes in neuroscience; discuss Sept. 10th)
Sept. 3rd	LABOR DAY—NO CLASSES	
Sept. 7th	2) From molecules to cells	
Sept. 10th & 14th	3) Neuron communication & plasticity	Johnson & Stevens, 2018 (topic: synaptic pruning and schizophrenia; discuss Sept. 17th)
Sept. 17th & 21st	5) Neuron circuits and pharmacology	Braganza & Beck, 2018 (topic: circuit motifs; discuss Sept. 24th)
Sept 24th & 28th	6) Neuroscience methods	
Oct. 1rd	**TEST 1**	
Oct. 5th	7) Neurons to knowing: the eye	
Oct. 8th & 12th	8) Sensory systems	Alonso, 2018 (optional full paper: Lien et al., 2018; topic: thalamocortical computation; discuss Oct. 15th)
Oct. 15th & 19th	9) Movement	Aber & Costa, 2018 (topic: motor hierarchy & division of labor; discuss Oct. 22nd)
Oct. 22nd & 26th	10) Reward & Decisions	Starkweather et al., 2018 (watch VIDEO ABSTRACT, try to understand intro and figures in paper; topic: uncertainty, prefrontal cortex, reward/motivation; discuss Oct. 29th)
Oct. 29th & Nov 2nd	11) Stress & Emotion	Post & Warden, 2018 (Circuits of depression; discuss Nov. 12th)
Nov 5th	**TEST 2 (Insel away)**	
Nov. 9th	12) Sleep	
Nov. 12th & 16th	13) Memory	Shrestha & Klann, 2016 (full: Roy et al., 2016; topic: long term memory in the cortex; discuss Nov. 19th)
Nov. 19th	14) Brain lateralization and language	Allen & Reznik, 2015 (topic: EEG frontal

Date	Topics	Assigned reading
		asymmetry & depression; discuss Nov. 30th)
Nov. 23rd	**THANKSGIVING—NO CLASS**	
Nov. 26th & 30th	15) Social behavior	Jiang & Platt, 2018 (summary: https://reliawire.com/oxytocin-group-hierarchy/ ; topic: oxytocin and social hierarchy; discuss Dec. 3rd)
Dec. 3rd & 7th	16) Review & Nervous System Disorders	

Final exam: The final exam will be a take-home exam. You will receive the exam on the last day of class and have approximately 1 week to complete it.

Learning outcomes

1. Know the meaning of "mechanism" and "levels of analysis".
2. Be able to describe the basic cellular components and processes that allow cells to signal with one-another.
3. Be able to describe why different signaling molecules exist in the nervous system and some of the basic functions associated with them.
4. Understand what "neuromodulator" means in the context of neural circuits, and how different drugs work on (or as) neuromodulators.
5. Be able to identify which experimental tools are appropriate for addressing which scientific questions within the domain of physiological psychology.
6. Be able to explain what is meant when it is said that information is transformed by the nervous system (including the meaning of "neural coding"), and cite examples from sensory and motor systems of what kinds of information transformations take place.
7. Be able to describe how the nervous system signals reward, and how these signals may result in particular decisions.
8. Understand basic principles of neuroendocrine autonomic nervous system signaling, and the relationship between this "visceral" system and emotion.
9. Be able to distinguish between different types of memory and know the relationship between these types and brain regions/processes.
10. Be able to describe sleep and sleep mechanisms at the neural level.
11. Be able to use examples from other species to describe how the nervous system supports social behavior.
12. Be able to make informed inferences about how dysfunction of the nervous system may result in specific neurological and neuropsychiatric conditions.