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Fall 9-1-2021

### NEUR 280.01: Fundamentals of Neuroscience

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#### Recommended Citation

Holick, Katie M. and Kavanaugh, Michael P., "NEUR 280.01: Fundamentals of Neuroscience" (2021).

*University of Montana Course Syllabi*. 12200.

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## Molecules to Mind - Fundamentals of Neuroscience

### Course information:

Time: Lectures Tu/Th 2:00-3:20

Course: 3 credits

Room: CHM 123

Prerequisites: None, but BIOH 160 is strongly recommended

### Course Instructors:

Dr. Katie M. Holick

Email: [katie.holick@umt.edu](mailto:katie.holick@umt.edu)

Office Phone: (406) 243-6486

Office Location: Skaggs 395C, 3<sup>rd</sup> Floor

Office Hours: TWR 10-11 or by appointment

(I am happy to Zoom or chat)

Michael Kavanaugh, Ph.D

E-mail: [Michael.Kavanaugh@umt.edu](mailto:Michael.Kavanaugh@umt.edu)

Office: Room Health Sciences

Office Hours: By appointment

Office Phone: (406)243-4398



### Textbook:

Required: *Principles of Neural Science*, edited by E.R. Kandel et al. 6<sup>th</sup> edition (5<sup>th</sup> edition may also be used)

(Available in the bookstore. One copy available for short term use in library, but access to a copy is assumed for the course). E-copies may be available through third-party providers.

### Course Overview

We work upward through the levels of biological organization. Specific topics include: neuronal signaling, the organization of sensory systems, the control of movement; mechanisms for learning, memory, and complex behaviors, such as language and emotion.

**Learning Outcomes:** Through lectures and discussion, the course is designed to ensure that you will learn general principles applicable to many questions that will arise about the human brain and behavior. The primary outcomes we strive for are

1. To develop a fundamental understanding of neuroscience through knowledge of the cellular and molecular properties of neurons and how they function in circuits.
2. To apply these principles to understand the higher-level organization and cognitive operations of the brain.
3. To comprehend and explain how neuroscience applies to health issues and provides an inspiration for new technologies.

### Course Assignments:

1. **Class Study Guide Questions:** Each week a set of questions will be posted for each lecture. These questions will be discussed during class meeting time and we will go over the structure the first day of class. Each person will be responsible for a question (could be on any day) to earn their 10 points for the week. If you fail to answer a question in any given week, you will not receive your 10 points. Each student will receive one pass to use this semester, so

use it wisely. I will not track attendance for this class but if you would like to receive these 10 points you must complete at least one question.

2. **Weekly Quizzes:** Each week an online quiz will be given for the Chapters covered within that week via the Moodle website. The purpose of these quizzes is to assess your understanding of the material presented that week in class. These quizzes will be due by midnight Friday of each week.
3. **Exams:** Three semester exams and one final exam will be given. Test formats will include multiple-choice and short answer questions plus occasional short essays. There may be some demonstrations or podcasts integrated into classes, and perhaps brief review quizzes. If you miss a semester exam, this will be graded as a zero. The final examination is cumulative and must be completed to receive a final grade. Failure to take the final exam will result in a failing grade. *All students are expected to take all exams when they are scheduled.* Students are expected to notify the instructor prior to missing an exam. Students are responsible for any changes in dates of scheduled exams, quizzes, or assignments or any other administrative announcement made during lectures. Write the word “electrified” on your first exam for two bonus points.
4. **Final Project:** Your final project will be a three-minute video on a topic in neuroscience. You will choose one partner and you will create a video targeting the general public but it must be informative, scientific, and demonstrate some level of creativity. A rubric for this assignment will be posted to Moodle.

<i>Your performance will be evaluated as follows:</i>	%	#	Points/Item	Total Points Awarded
Study Guide Materials	16.3%	13	10	130
Quizzes	15%	12	10	120
Semester Exams	37.5%	2	150	300
Final Presentation/Assignment	12.5%	1	100	100
Final Exam	18.8%	1	150	150
<b>Total</b>	<b>100%</b>			<b>800</b>

**Accessibility Syllabus Statement:**

The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, [ode@umontana.edu](mailto:ode@umontana.edu), or visit [www.umt.edu/disability](http://www.umt.edu/disability) for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish.

Any questions please contact me.

**COVID STATEMENT:**

- Mask use is required within the classroom or laboratory.
- If you feel sick and/or are exhibiting COVID-19 symptoms, please don't come to class and contact the Curry Health Center at (406) 243-4330.
- If you are required to isolate or quarantine, you will receive support in the class to ensure continued academic progress. All class materials and lectures will be posted on Moodle.
- UM recommends students get the COVID-19 vaccine. Please direct your questions or concerns about vaccines to Curry Health Center.
- Where social distancing (maintaining consistent 6 feet between individuals) is not possible, specific seating arrangements will be used to support contact tracing efforts.
- Class attendance and seating will be recorded to support contact tracing efforts.

- Drinking liquids and eating food is discouraged within the classroom.
- Please note this class is being recorded. Notifying students is a requirement if this is the case.

### Schedule Fall 2021

\*Topics and dates are subject to change\*

Week	Date	Topic	Chapter(s)	Instructor
1	Aug 31 Sept 2	Overview/ The Brain and Behavior	1	Holick
2	Sept 7 Sept 9	The Organization of the Central Nervous System	15	Holick
3	Sept 14 Sept 16	Nerve Cells, Neural Circuitry, and Behavior	3	Holick
4	Sept 21 Sept 23	Genes and Behavior	2	Holick
5	Sept 28 Sept 30	The Neuroanatomical Bases by Which Neural Circuits Mediate Behavior	4	Holick
6	Oct 5 Oct 7	<b>Exam 1</b> The Computational Bases of Neural Circuits That Mediate Behavior	5	Kavanaugh
7	Oct 12 Oct 14	The Computational Bases of Neural Circuits That Mediate Behavior Imaging and Behavior	5 6	Kavanaugh Holick
8	Oct 19 Oct 21	The Cells of the Nervous System	7	Holick
9	Oct 26 Oct 28	Ion Channels	8	Holick
10	Nov 2 Nov 4	Ion Channels <b>Exam 2</b>	8	Holick
11	Nov 9 Nov 11	Membrane Potential and Passive Electrical Properties <b>No Class Veterans Day</b>	9	Kavanaugh
12	Nov 16 Nov 18	Membrane Potential and Passive Electrical Properties	9	Holick

13	Nov 23 Nov 25	Propagated Signaling: The Action Potential <b>A Day of Feast</b>	10	Holick
14	Nov 20 Dec 2	Overview of Synaptic Transmission Neurotransmitters	11 16	Holick
15	Dec 7 Dec 9	Presentations Review Session		Holick
Finals Week	TBA	<b>Exam 3 FINAL</b>		