

# BIO 417/517 NEUROBIOLOGY

This course is intended to focus on the basic concepts of Neurobiology. The emphasis will be primarily on the cellular aspects of function within the nervous system. Students who successfully complete this course should be able to describe how an action potential is formed, understand the proteins involved in cell signaling and synaptic transmission, and be able to discuss how sensory systems function.

Time and Location: MWF 9:00-9:50 AM  
Cooke 121

Instructors:	Dr. Mary Bisson	Dr. Kathryn Medler
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Office Hours: Office appointments are intended to clarify lecture material, NOT to review entire lecture contents. Questions about specific lecture material need to be directed to the presenting lecturer.

Bisson

Medler  
M10-12

Textbook: Neuroscience (Fifth Edition) by Purves et al. ISBN 978-0-87893-695-3

Grading: Letter grades will be determined from 400 total points. No extra credit will be given. Any assignment of +/- or curving of grades will be at the discretion of the instructors and will be made at the end of the semester. No decision will be made until final grades are assessed.

Four exams (in class), 100 points each, 400 points total.

An optional comprehensive final exam will be offered during finals week which can be used to replace the lowest test grade or a missed test from earlier exams.

Grading scale: >360=A range, 320-359=B range, 280-319=C range, 240-279=D range, <236=F

Makeup policy: Makeups may only be scheduled for medical reasons. To schedule a makeup exam, the student must submit a signed doctor's note within 24 hours explaining why the student couldn't attend the exam at the correct time. The note must include the doctor's name and phone number for verification. Makeup exams will be all short answer/essay questions and must be taken before exam keys are posted and exams are returned. Otherwise, any missed exams will count as a 0 towards the final grade. There will be NO MAKE UPS for the final exam.

It is each student's responsibility to obtain lecture notes and learn the material covered. Similarly, each student is responsible for any announcement given in class - 'Not being in class' is not an excuse.

## BIO 517

Students enrolled for graduate credit (BIO 517LEC) will be graded separately from BIO 417, but will utilize the same grading scale, including any curving or assignment of +/- to the grades.

### Course Outline

class	date	Topic	lecturer	reading
1	8/27	Course overview, Basic concepts		Ch. 1
2	8/29	Electrical signaling	B	Koester (1985)
3	8/31	Membrane potential I	B	Ch. 2
	9/3	Labor Day - no class	----	Labor Day - no class
4	9/5	Membrane potential II	B	Ch. 2
5	9/7	Electrical properties, Voltage clamp	B	Ch. 3
6	9/10	Action potential I	B	Ch. 3
7	9/12	Action potential II	B	Ch. 3
8	9/14	Propagation	B	Ch. 3
9	9/17	Ion channels	M	Ch. 4
10	9/19	<b>Exam 1</b>	B	(Lectures 1-8)
11	9/21	Ion channels	M	Ch. 4
12	9/24	Ion channels	M	Ch. 4
13	9/26	Neurotransmitters/receptors	M	Ch. 6
14	9/28	Neurotransmitters/receptors	M	Ch. 6
15	10/1	Neurotransmitters/receptors	M	Ch. 6
16	10/3	G-protein signaling	M	Ch. 7
17	10/5	G-protein signaling	M	Ch. 7
18	10/8	G-protein signaling	M	Ch. 7
19	10/10	Synapses I – Electrical synapses	M	Ch. 5
20	10/12	<b>Exam 2</b>	M	(Lectures 9-18)
21	10/15	Synapses II – Calcium dependence	M	Ch. 5
22	10/17	Synapses III – Quantal hypothesis	M	Ch. 5
23	10/19	Synapses IV -- Molecular mechanisms	M	Ch. 5
24	10/22	Synapses V -- Recycling	M	Ch. 8
25	10/24	Synapses VI -- Integration	M	Ch. 8
26	10/26	Synapses VII – Short-term plasticity	M	Ch. 8
27	10/29	Synapses VIII – Long-term plasticity	M	Ch. 8
28	10/31	<b>Exam 3</b>	M	(Lectures 19-27)
29	11/2	Somatosensory system	M	Ch. 9
30	11/5	Somatosensory system	M	Ch. 9

31	11/7	Pain	M	Ch. 10
32	11/9	Pain	M	Ch. 10
33	11/12	Vision	M	Ch. 11
34	11/14	Vision	M	Ch. 11
35	11/16	Vision	M	Ch. 11
36	11/19	Vision	M	Ch. 12
	11/21	Thanksgiving – no class		
	11/23	Thanksgiving – no class		
37	11/26	Vision	M	Ch. 12
38	11/28	Chemical Senses	M	Ch. 15
39	11/30	Chemical Senses	M	Ch. 15
40	12/3	Chemical Senses	M	Ch. 15
41	12/5	Chemical Senses	M	Ch. 15
42	12/7	<b>Exam 4</b>	M	(Lectures 33-41)
		<b>Optional Comprehensive</b>		9:00-11:00

## Learning Objectives

BIO417 is designed to meet specific learning objectives for enrolled students. These learning objectives are listed in the table below:

	<b>Program Learning Outcome</b>	<b>Depth</b>	<b>Specific outcome objectives</b>	<b>Assessment instrument</b>
<b>1</b>	Provide breadth of knowledge of basic principles and concepts	1	Apply basic physical, chemical, biochemical, and physiological principles to understand nervous system function	Exams
<b>2</b>	Provide depth within specialized areas	2	Understand how signals are transduced and conveyed centrally for sensory systems	Exams
			Understand the basics of electrophysiology, neurochemistry, and synaptic transmission	Exams
<b>3</b>	Provide an understanding of experimental design and methodology	1	Know critical experiments that were used to expose the mechanisms involved in each area above	Exams
<b>4</b>	Develop approaches for integration of information	1	Understand the contribution of physical properties of biological systems to their function	Exams
<b>5</b>	Provide contemporary information	2	Understand key recent findings about electrical and chemical signaling within and between neurons, and sensory systems	Exams

Depth

1=covered

2=extensively covered

The course learning objectives will be met when 80% of the enrolled students achieve a final course grade of D or higher. This represents a point score that is 60% of the total possible points.

BIO 517 is designed to meet specific learning objectives for enrolled students. These learning objectives are listed in the table below:

	<b>Program Learning Outcome</b>	<b>Depth</b>	<b>Specific outcome objectives for your course</b>	<b>Assessment instrument</b>
<b>1</b>	Provide breadth of knowledge of basic principles and concepts	1	Apply basic physical, chemical, biochemical, and physiological principles to understand nervous system function	Exams
<b>2</b>	Provide depth within specialized areas	2	Understand how signals are transduced and conveyed centrally for sensory systems	Exams, Recitation
			Understand the basics of electrophysiology, neurochemistry, and synaptic transmission	
<b>3</b>	Provide an understanding of experimental design and methodology	2	Know critical experiments that were used to expose the mechanisms involved in each area above	Exams, Recitation
<b>4</b>	Develop approaches for integration of information	1	Understand the contribution of physical properties of biological systems to their function	Exams
<b>5</b>	Encourage critical thinking and hypothesis building	2	Analyze important research papers	Recitation
			Understand the reasoning behind each experiment	Recitation
			Understand how experiments are designed to confirm or refute hypotheses	Recitation
<b>6</b>	Provide contemporary information	2	Understand key recent findings about electrical and chemical signaling within and between neurons, and sensory systems	Exams, Recitation
<b>7</b>	Encourage appreciation of scientific values	1	Understand what drives researchers to perform certain experiments	Recitation

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