

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. Matthew Xu-Friedman
H661 Hochstetter
Phone: 645-4992
e-mail: mx@buffalo.edu

Dr. Kathryn Medler
C619 Cooke Hall
645-4947
kmedler@buffalo.edu

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.

Xu-Friedman
W11-1pm, appt

Medler
M10-12

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

Grading: Letter grades will be determined from 420 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, plus 2 labs 10 points each

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: >378=A, 336-377=B, 294-335=C, 252-293=D, <252=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. Students enrolled in BIO 517REC need to speak with the lecturers to obtain their additional course requirements. This portion of the course is to give graduate students better insight into the current literature, by analyzing recent or seminal papers in great detail. Recitation sections are held on the Mondays indicated from 1–3 PM in Cooke 109. Papers are related to topics in the lecture part of the course. Be prepared to answer detailed questions related to the importance of the paper, the methods used, the experimental findings, and the significance of the study. The grade for 517REC is based on performance in recitations (120 points). Attendance at all recitations is required and cannot be made up. Missing two or more recitations will result in a zero for the entire recitation grade.

Course Outline

class	date	Topic	lecturer	reading	BIO 517
1	8/28	Course overview, Basic concepts	X-F	Ch. 1	
2	8/30	Electrical signalling	X-F	Koester (1985)	
3	9/1	Membrane potential I	X-F	Ch. 2	
	9/4	Labor Day - no class	----	Labor Day - no class	
4	9/6	Membrane potential II	X-F	Ch. 2	
5	9/8	Electrical properties, Voltage clamp	X-F	Ch. 3	
6	9/11	Action potential I	X-F	Ch. 3	
7	9/13	Action potential II	X-F	Ch. 3	
8	9/15	Propagation	X-F	Ch. 3	
9	9/18	Ion channels	M	Ch. 4	
10	9/20	Exam 1	X-F	(Lectures 1-8)	
11	9/22	Ion channels	M	Ch. 4	
12	9/25	Ion channels	M	Ch. 4	MX-JC
13	9/27	Neurotransmitters/receptors	M	Ch. 6	
14	9/29	Neurotransmitters/receptors	M	Ch. 6	
15	10/2	Neurotransmitters/receptors	M	Ch. 6	KM-JC
16	10/4	G-protein signaling	M	Ch. 7	
17	10/6	G-protein signaling	M	Ch. 7	
18	10/9	G-protein signaling	M	Ch. 7	
19	10/11	Synapses I – Electrical synapses	X-F	Ch. 5	
20	10/13	Exam 2	M	(Lectures 9-18)	
21	10/16	Synapses II – Calcium dependence	X-F	Ch. 5	
22	10/18	Synapses III – Quantal hypothesis	X-F	Ch. 5	
23	10/20	Synapses IV -- Molecular mechanisms	X-F	Ch. 5	

24	10/23	Synapses V -- Recycling	X-F	Ch. 8	MX-JC
25	10/25	Synapses VI -- Integration	X-F	Ch. 8	
26	10/27	Synapses VII – Short-term plasticity	X-F	Ch. 8	
27	10/30	Synapses VIII – Long-term plasticity	X-F	Ch. 8	
28	11/1	Anatomy I – Spinal cord	X-F	Appendix	
29	11/3	Anatomy II – Brain	X-F	Appendix	
30	11/6	Brain dissection	X-F	Room -TBA	MX-JC
31	11/8	Brain dissection	X-F	Room -TBA	
32	11/10	Exam 3	X-F	(Lectures 19-31)	
33	11/13	Somatosensory system	M	Ch. 9	
34	11/15	Somatosensory system	M	Ch. 9	
35	11/17	Pain	M	Ch. 10	
36	11/20	Pain	M	Ch. 10	KM-JC
	11/22	Thanksgiving – no class			
	11/24	Thanksgiving – no class			
37	11/27	Vision	M	Ch. 11	
38	11/29	Vision	M	Ch. 11	
39	12/1	Vision	M	Ch. 11	
40	12/4	Vision	M	Ch. 12	KM-JC
41	12/6	Vision	M	Ch. 12	
42	12/8	Exam 4	M	(Lectures 33-41)	
	12/13	Optional Comprehensive		9:00-11:00	C121

Learning Objectives

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

	Program Learning Outcome	Depth	Specific outcome objectives	Assessment instrument
1	Provide breadth of knowledge of basic principles and concepts	1	Apply basic physical, chemical, biochemical, and physiological principles to understand nervous system function	Exams
2	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
3	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
4	Develop approaches for integration of information	1	Understand the contribution of physical properties of biological systems to their function	Exams
5	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:

	Program Learning Outcome	Depth	Specific outcome objectives for your course	Assessment instrument
1	Provide breadth of knowledge of basic principles and concepts	1	Apply basic physical, chemical, biochemical, and physiological principles to understand nervous system function	Exams
2	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	
3	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
4	Develop approaches for integration of information	1	Understand the contribution of physical properties of biological systems to their function	Exams
5	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
6	Provide contemporary information	2	Understand key recent findings about electrical and chemical signaling within and between neurons, and sensory systems	Exams, Recitation
7	Encourage appreciation of scientific values	1	Understand what drives researchers to perform certain experiments	Recitation

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.