
BIO 443: Neurobiology

Course Information

Course: BIO 443: Neurobiology

Lecture: T R 9:30 – 10:45

Place: Dobo 103

Prerequisites: BIO 240 or BIO 345 or PSY 256

Instructor

Asst/Prof. Kara E. Yopak

Office: CMS 2332

Email: yopak@uncw.edu

Office Hours: Tuesdays 10:45-11:45 (after class) or by email appointment

Text

Required: Neurobiology: A Functional Approach by Georg. F. Striedter (available in hard copy or as an e-book.)

Course Overview

This course covers the broad area of neuroscience – at both the peripheral and central level – and integrates these themes within an evolutionary framework, from invertebrates to vertebrates. We will explore general concepts of cellular neuronal signaling and circuit connectivity, with an emphasis on how simple neuronal circuits produce behavior and behavioral variability.

Learning Outcomes

BIO443 will give you a solid background in most aspects of neuroscience, ranging from molecular neurobiology to neurobiological disorders to evolutionary changes in brain size, brain region size, and sensory systems across vertebrates. You will have learned to integrate across different levels of analysis, understanding that a functioning nervous system involves networks of molecules as well as networks of neurons, all interacting with one another and the outside world.

At the end of this course, you will be able to:

- Describe the structure and function of the nervous system across various levels of biological organization.
- Know the location, appearance, and basic functions of the major mammalian brain regions and systems.
- Understand the molecular basis of major neurobiological functions.
- Trace key neural circuits of the sensory and motor systems.
- Evaluate the neurobiological basis of higher functions, such as learning and memory.
- Describe how the brain has evolved across broadly divergent taxa, from invertebrates to vertebrates, and how this relates to cognitive function and behavioral flexibility.

Unit Structure

This unit will be based around course lectures and assigned reading, as well as Brain Exercises that encourage you to integrate core concepts. Because of the high volume of information, we will cover 1-1.5 chapters per week. Therefore, it is **highly recommended** that you read the Chapter listed prior to each lecture to prepare you for what will be discussed (see unit structure below). Notes will be posted on the day prior to each lecture, which you can print and bring to class assist in your own note taking.

This schedule is tentative and subject to change, depending on University closures, the progress of the class, and the discretion of the instructor. You will be informed of any changes in class and via BlackBoard.

Lec	Date	Chapter Reading	Lecture
01	T 1/9	Chapter 1, sections 1.1-1.3	Course Introduction + Brain Organization I
02	R 1/11	Chapter 1, sections 1.3-1.6 Chapter 2, Section 2.1	Brain Organization II
03	T 1/16	Chapter 2, sections 2.1-2.3, 2.5	Resting/Action Potentials + Neuron Diversity
04	R 1/18	Chapter 2, section 2.4	Synaptic Transmission
05	T 1/23	Chapter 3, sections 3.1-3.4	Synaptic Plasticity
06	R 1/25	Chapter 3, sections 3.3-3.6 Chapter 4, section 4.1	Rewiring the Brain + Early Brain Development
07	T 1/30	Chapter 4, sections 4.2-4.5	Early Brain Development II
08	R 2/1	Chapter 4, sections 4.5-4.7 Chapter 5, sections 5.1	Fine Tuning Brain Development + Adult Neurogenesis
09	T 2/6	Chapter 5, sections 5.2 - end	Protecting the Brain and the Brain's Energy Supply & Brain Exercises Due (Chapters 1-5)
	R 2/8	Chapters 1-5	EXAM 1
10	T 2/13	Chapter 6, sections 6.1-6.2	Sensing Remote Stimuli – Vision & Olfaction
11	R 2/15	Chapter 6, sections 6.3 – end Chapter 7, sections 7.1	Sensing Remote Stimuli – Hearing Sensing on Contact – Touch
12	T 2/20	Chapter 7, sections 7.1 - end	Sensing on Contact – Temperature, Taste, & Balance
13	R 2/22	Chapter 8, sections 8.1-8.4	Movement & Muscles
14	T 2/27	Chapter 8, section 8.5 Chapter 9, section 9.1-9.2	Glands, Hormones & Regulating Vital Bodily Functions
15	R 3/1	Chapter 9, sections 9.3-9.5	Regulating Vital Bodily Functions II
	M 3/5 – F 3/9	--	NO CLASS – Spring Break
16	T 3/13	Chapter 10, sections 10.1-10.4	Controlling Posture and Locomotion
17	R 3/15	Chapters 10, sections 10.5 – end	Neural Control of Movement & Brain Exercises Due (Chapters 6-10)
	T 3/20	Chapters 6-10	EXAM II
18	R 3/22	Chapter 11, sections 11.1-11.4	Localizing Stimuli + Orienting in Space
19	T 3/27	Chapter 11, section 11.5 Chapter 12, sections 12.1-12.2	Identifying & Encoding Stimuli
	R 3/29	--	NO CLASS – Easter Weekend
20	T 4/3	Chapter 12, sections 12.3-12.5 Chapter 13, section 13.1	Perceiving Objects & Regulating Brain States
21	R 4/5	Chapter 13, sections 13.2 – end	Regulating Brain States II
22	T 4/10	Chapter 14, sections 14.1-14.6	Learning & Memory
23	R 4/12	Chapter 14, sections 14.7-14.9 Chapter 15, sections 15.1-15.2	Fear, Selecting Actions, & Pursuing Goals
24	T 4/17	Chapter 15, sections 15.3 – end	Selecting Actions, Pursuing Goals II
25	R 4/19	Chapter 16, sections 16.1-16.3	Being Different From Others I: Allometry & Evolution
26	T 4/24	Chapters 16, sections 16.4 – end	Being Different From Others II: Intraspecific Variation & Brain Exercises Due (Chapters 11-16)
	T 5/1	Chapters 11-16	FINAL (EXAM III) 8:00-11:00

Assessments

Students will be evaluated via exams, quizzes and brain exercises in order to show their understanding of topics and ability to integrate information. The unit is assessed as follows:

Activity	Description	Percentage of Final Grade
Exams	2 midterms + non-cumulative final	75% (25% each)
Brain Exercises	Marked as pass/fail	15%
Pop Quizzes	Scattered throughout course	10%

Exams: The three exams, worth **25%** of your final grade each, will be based on the theory covered in lectures *and* the core reading material set for each lecture. They will include a combination of multiple choice, fill-in-the-blank, and short answer style questions. Final letter grade will be determined by a percentage of total points. Letter grades will not be given for individual exams – only percentage grades will be provided.

The final grade is based upon the percentage scores below. The percentages required for each grade may be changed at the discretion of the instructor.

Letter Grade	Percentages
A	94-100%
A-	90-93%
B+	87-89%
B	84-86%
B-	80-83%
C+	77-79%
C	74-76%
C-	70-73%
D+	67-69%
D	64-66%
D-	60-63%
F	< 60%

Brain Exercises: There will be 16 sets of Brain Exercises, one for each chapter in the book, worth 15% of your final grade. They are designed to encourage you to think about what you just read and reinforce topics discussed in lecture. Some questions will be open-ended and lack simple answers, but trying to answer them will help you integrate the information and remember it. Because of this, each set is graded on a **pass/fail** basis – if you make a valid attempt, you will pass. Not handing in the Exercise or not making a valid effort to answer the questions will result in a fail.

Brain Exercises are available in BlackBoard and must be submitted by the start of class on the date due. They should be submitted via BlackBoard **no later than 9:29am** the day they are due. If the submission is not received by this time, you will **not** receive credit for the Brain Exercise. *No late Brain Exercises will be accepted.*

Pop Quizzes: There will be unannounced in-class quizzes scattered throughout the course. These are worth 10% of your final grade and are meant to ensure that you attend class and complete the reading assignments. They will also provide excellent preparation for your exams. To account for a day you may miss class or do poorly on a particular quiz, your lowest pop quiz grade will be dropped at the end of the semester. Because of this, *no make-up for pop quizzes will be allowed.*

Resources

There are some additional resources available to help you as we go through the course, including a zoomable human brain atlas (from Nissl- and fiber-stained sections through real human brains), a human brain MRI atlas, Electronic flashcards covering the key terms from the text, and a curated index to hundreds of high-quality and freely-available animations and videos of neurobiological processes. These are all available from BlackBoard under “Course Resources.”

Course Policies

Classroom Environment

I encourage participation and open discussion during class to facilitate learning. This can only occur in environment that encourages and promotes inclusiveness, mutual respect, acceptance, and open-mindedness among students and instructors. The values endorsed in the [Seahawk Respect Compact](#) will be upheld in the classroom, and any students deviating from this code will be required to leave.

Attendance

Because this course covers a large amount of material in a relatively short amount of time, attendance is essential. Regular attendance will keep you up to date on class announcements, introduce you to the material, allow you to gauge the relative importance of material covered both in class and in the text, provide you with opportunities to actively engage in learning, and lay the foundation upon which you will prepare for exams. Although notes may be posted for each lecture on BlackBoard, the lectures themselves will **not** be made available online.

BlackBoard + Email

It is critical to *actively check* your UNCW e-mail account as part of this course. Students are also expected to log into the unit’s BlackBoard site regularly. BlackBoard is used to post important information such as announcements, lecture notes, video links, and Brain Exercises. It is your responsibility to let me know immediately if you are having trouble receiving class e-mails or accessing BlackBoard information.

Exams

My expectation is that you will be present for all of the exams. Make-up exams will **not** be given without an acceptable and *documentable* excuse, such as a medical or family emergency. This will require a written reason from a University Official or a licensed medical practitioner, stating why you are unable to be present. If you have a planned absence on official university business (and tell me ahead of time), have the appropriate University Official contact me and confirm your absence, and then communicate with me in advance to arrange for a make-up. Other reasons, including being out of town, oversleeping, a cold, or forgetfulness are not considered acceptable excuses.

To contest an answer scored as incorrect, you **must** submit a written argument to the instructor by the **next** scheduled class after receiving your grade. Your response should include why you believe the instructor’s answer to the question is wrong and why your answer is correct. Documentation is essential for successful argumentation.

Cell Phones and Other Electronic Devices

Please turn off cell phones and other electronic devices during lectures, unless they are being used for note taking. Cell phones and other electronic devices (including Smart Watches) **MUST** be completely powered down and stowed during exams.

Disabilities

If you are a person with a disability and anticipate needing accommodations of any type for this course, you must first notify Disability Services (<http://uncw.edu/disability/about/index.html>) in DePaolo Hall, provide the necessary documentation of the disability, and arrange for the appropriate authorized accommodations. Once these accommodations are approved, please identify yourself to me so that we can implement these accommodations. Where the DRC recommends reduced distractions or additional time for exams, students must arrange to have their exam proctored at the DRC. Please be sure to let me know when you have made these arrangements.

Academic Dishonesty

Academic dishonesty will not be tolerated. As a student at UNCW you are bound by the [Student Academic Honor Code](#). Violations of the Student Code of Conduct are subject to university discipline. Action can include assignment of a grade of "0" on the appropriate assignment, assignment of an "F" grade in the course, or referral to the College of Arts and Sciences for more severe action. This includes use of any electronic device during an exam. The Department of Biology and Marine Biology strongly supports the honor code and any actions that run counter to this code will not be tolerated in this course.

Violence and Harassment:

UNCW practices a zero-tolerance policy for violence and harassment of any kind. For emergencies contact UNCW CARE at 962-2273, Campus Police at 962-3184, or Wilmington Police at 911. For University or community resources visit <http://uncw.edu/wrc/crisis.htm>.