

Introduction to Neuroscience

NEUR 101-001, Spring 2023

Instructor: Dr. Gwendolyn (Wendy) Lewis

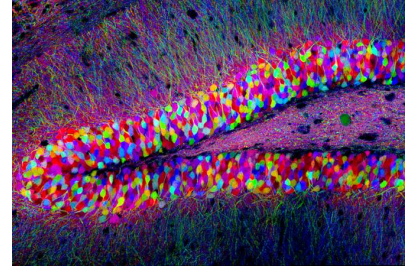
Instructor email: glewis13@gmu.edu

Course Format: Monday & Wednesday 10:30am-11:45am

Credits: 3

Office Hours: Drop-in office hours are held during the times below. If you are unable to attend a drop-in time, please email me to schedule an appointment. I will do my best to accommodate.

- **Monday 12pm-1pm. virtual** <https://gmu.zoom.us/j/4952912681> **or in person in Krasnow 254**
- **Thursday 2pm-3pm virtual** <https://gmu.zoom.us/j/4952912681> **or in person in Krasnow 254**



Course Overview

The nervous system controls everything we think, do, and feel. But how does it do this? And what happens when things go wrong? In this course, we will answer these questions by providing an introduction to the study of the brain (neuroscience). We will cover basic concepts in neuroscience such as neurons, action potentials, and synapses and examine their involvement in everyday life. We will explore what neuroscience has already uncovered about human development, aging, and disease. This course is meant to serve as an introduction to neuroscience for students of all majors.

Mason Core: Natural Science, Non-lab

This is a Natural Science, non-lab Mason Core course. This course aims to enhance your understanding of scientific inquiry by introducing you to the tools and methods of neuroscience as well as the application of emerging neurotechnologies for personal, medical, and social purposes.

Course Modality

This is an in-person, face-to-face course. There will be no concurrent instruction, meaning the class will not be streamed online or recorded, and students will not be able to attend virtually. If you are unable to come to class due to illness or other issue, please see the policy under Attendance and Late Work below.

Safe Return to Campus

All students taking courses with a face-to-face component should review and follow the university's current public health and safety procedures outlined on the university Safe Return to Campus webpage (<https://www2.gmu.edu/safe-return-campus>). **If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. DO NOT ATTEND CLASS IF YOU ARE SICK!**

Blackboard Login Instructions

Assignments will be posted and submitted to Blackboard. To access the course Blackboard site, log in to mymason.gmu.edu and select the Courses tab. Under the course list, select the current semester (Spring 2023) and click the course number for NEUR-101-001.

Office Hours and Course Help

Getting help is easy. I am available for office hours every week during the times listed at the top of the syllabus. Please check Blackboard Announcements for any adjustments to office hours. You can also get help by posting questions to the *Ask the Instructor* discussion forum in Blackboard.

Natural Science Core Learning Goals

Natural science learning goals and the course activities that support them are listed below.

- Understand how scientific inquiry is based on investigation of evidence from the natural world, and that scientific knowledge and understanding:
 - a) evolves based on new evidence
 - b) differs from personal and cultural beliefs
 - Evidence Based Science Unit
 - Neuroscience and Society Project
- Recognize the scope and limits of science.
 - Evidence Based Science Unit
 - Neuroscience and Society Project
 - Neuroethics Unit
- Recognize and articulate the relationship between the natural sciences and society and the application of science to societal challenges (e.g., health, conservation, sustainability, energy, natural disasters, etc.).
 - Neuroscience and Society Project
 - Methods and Emerging Technologies Unit
- Evaluate scientific information (e.g., distinguish primary and secondary sources, assess credibility and validity of information).
 - Evidence Based Science Unit
 - Sources Unit
 - Neuroscience and Society Project

Neuroscience Learning Goals

Neuroscience content-specific learning goals are listed below.

- Describe how the human nervous system is organized from development into adulthood.
- Understand the key mechanisms of brain activity such as action potentials and brain waves.
- Describe how the brain mediates our daily activities from sleep to eating to remembering.
- Appreciate how the nervous system controls complex activities such as movement.
- Understand the basis of key human brain diseases such as Alzheimer's and Parkinson's Disease.
- Find and interpret various types of scientific literature, distinguish the quality of and relevance of sources.
- Evaluate current ethical debates in neuroscience.

- Describe how current technology is used to advance understanding in neuroscience.

Textbook and Materials

No textbook is required. Open educational resources will be provided from various sources.

Grading Scale:

Blackboard grades are rounded to the nearest whole number.

A+ 97-100%	B+ 87-89%	C+ 77-79%	D 60-69%	F 0-59%
A 90-96%	B 80-86%	C 70-76%		

Grading and Assessments

Homework	10%
Neuroscience and Society Project	15%
Exams (3 x 25% each)	75%

Total Grade **100%**

Homework: Throughout the semester there will be 5 homework assignments. These will help deepen your understanding of the lecture content. Homework assignments will be posted to and turned in through Blackboard.

Neuroscience and Society Project: The goal of this assignment is to apply your new knowledge of neuroscience to examine a current problem or social issue. Possible problems include:

- Drug and behavioral treatment for a mental illness in children
- Animal models of human brain disease (examples: Alzheimer's Disease, Schizophrenia)
- Human-machine interface technologies
- Treatment for nervous system disease
- Genetic testing for brain disease and/or intelligence
- Gene editing to treat brain disease

You will research your topic through primary scientific literature and prepare an informational flyer that defines and examines the problem through the lens of scientific evidence. Further details of the project will be provided.

Exams: There will be 2 regular exams and 1 non-cumulative final exam. These exams may consist of multiple choice, matching, fill in the blank or short answer questions. Students are allowed one 8.5 x 11 sheet of paper notes (front and back) during the exam.

Policies

Attendance: Attendance is expected and is essential for succeeding in the course. Material will be covered in class that is not contained in the slides.

Late Work: Unless prior arrangements are made, late work will incur a deduction of 20% and will not be accepted more than two weeks after the due date. No late work will be accepted after Sunday, May 7th. It is imperative that you contact me as soon as possible regarding any issues that may affect your ability to complete assignments.

Missed Exams: Make-up exams may be offered at the discretion of the instructor. Generally, a make-up exam will only be offered in case of emergency or illness and may require documentation. The request for a make-up exam must be submitted by the day of the exam.

Extra Credit: You can earn up to 5 points of extra credit by sharing something to the “Cool Stuff” discussion board forum. You can earn 3 points for posting something interesting and neuroscience related to this forum, and 1 point for responding to another students post. You can earn an additional 5 points of extra credit by attending a seminar and writing a summary (details in the Assignments area of Blackboard). Extra credit will be added to the Exams grade at the end of the course. No additional or individual extra credit will be available.

Communication: If you need to contact me, please do so using e-mail **from your university account only**, and **include the course name in the subject line and include your name in the e-mail**. Check your e-mail and course Blackboard account daily and before each class meeting. I will use e-mail and Blackboard to communicate with you regarding changes related to the course, syllabus, and other essential information. You are responsible for all announcements posted and sent via Blackboard and e-mail, in addition to announcement make in class.

Conduct: Be kind and respectful to your classmates. Disrespectful behavior will lead to a potential deduction of points from the course, and an unhappy me.

Academic Integrity: Honesty and integrity are issues at the very core of this course and of science as a whole. George Mason has an honor code with clear guidelines for academic integrity. A few of the most important rules that pertain to this course are: 1) All work submitted must be your own should be done individually unless explicitly stated otherwise. You will be encouraged to discuss ideas, collaborate, and brainstorm with your classmates, but actual assignments need to be completed individually. 2) When referencing the work of others (this includes published and non-published work or ideas), full credit must be given through appropriate citations. 3) If you are ever unsure about the rules for an assignment, ask for clarification. Cheating and plagiarism of any form is not tolerated. Plagiarism means using the exact words, opinions, or information from another person without giving the appropriate credit. Per the Office of Academic Integrity, “subcategories of plagiarism include:

- Self-plagiarism: Intentionally or unintentionally using portions of one’s old work for new assignments without appropriate attribution and/or advanced permission from the current course instructor
- Failure to adequately quote and/or cite sources or material
- False citation: This includes but is not limited to referencing work that does not appear in the indicated source.”

Any offense will be referred to the academic integrity office and be dealt with in accordance with university regulations. Get more information about the Office of Academic Integrity here:

<https://oai.gmu.edu/>. Get more information about plagiarism here <https://oai.gmu.edu/mason-honor-code/what-is-plagiarism/> and tips for avoiding it here <https://writingcenter.gmu.edu/writing-resources/citing-sources/plagiarism>.

Disability Accommodations

If you have a documented learning disability or other condition that may affect academic performance you should: 1) make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474; <http://ods.gmu.edu>) to determine the accommodations you need; and 2) talk with me to discuss your accommodation needs.

Mason Diversity Statement*

George Mason University promotes a living and learning environment for outstanding growth and productivity among its students, faculty and staff. Through its curriculum, programs, policies, procedures, services and resources, Mason strives to maintain a quality environment for work, study and personal growth. An emphasis upon diversity and inclusion throughout the campus community is essential to achieve these goals. Diversity is broadly defined to include such characteristics as, but not limited to, race, ethnicity, gender, religion, age, disability, and sexual orientation. Diversity also entails different viewpoints, philosophies, and perspectives. Attention to these aspects of diversity will help promote a culture of inclusion and belonging, and an environment where diverse opinions, backgrounds and practices have the opportunity to be voiced, heard and respected.

** This is an abbreviated statement; full statement is available at <http://ctfe.gmu.edu/professional-development/mason-diversity-statement/>*

Privacy and E-mail Use

Students must use their MasonLive email account to receive important University information, including communications related to this class. I will not respond to messages sent from or send messages to a non-Mason email address. Student privacy is protected under FERPA (<https://registrar.gmu.edu/ferpa/>).

Student Services

- Learning Services (learningservices.gmu.edu/keeplearning/)
- University Libraries (library.gmu.edu)
- Writing Center (writingcenter.gmu.edu)
- Counseling and Psychological Services (caps.gmu.edu)
- See [a longer list of Mason student support services posted on The Stearns Center website.](#)

Add/Drop Deadlines

Deadlines for the Spring 2023 semester can be found on the [Mason Academic Calendar page](#).

All policies may be modified at the discretion of the instructor.

Course Calendar

NEUR 101-001 Spring 2023

Week	Date	Topic	Readings and Assignments Due <i>All assignments are due before class (10:29am) and will be submitted to Blackboard unless noted. Read/Watch should be completed before class.</i>
1	Jan 23	Introduction/ What is Neuroscience?	
	Jan 25	Cells of the Nervous System	Read/Watch <ul style="list-style-type: none"> • Know Your Neurons: The Discovery and Naming of the Neuron • Know Your Neurons: How to Classify Different Types of Neurons • 2-Minute Neuroscience: The Neuron • 2-Minute Neuroscience: Glial Cells
2	Jan 30	Building a Brain: Development	Read <ul style="list-style-type: none"> • The Life and Death of a Neuron
	Feb 1	Building a Brain: Development	
3	Feb 6	Organization of the Nervous System	Homework 1 Due Read/Watch <ul style="list-style-type: none"> • The Brain (Bozeman Science) • Brain Evolution: Searching for What Makes Us Human
	Feb 8	Action Potentials and Synapses	Watch <ul style="list-style-type: none"> • The Squids Giant Axons • 2-Minute Neuroscience: Action potential • 2-Minute Neuroscience: Synaptic Transmission
4	Feb 13	<i>Scientific Principles I: Evidence-Based Science</i>	Read <ul style="list-style-type: none"> • Shah et al. 2017 posted in Blackboard
	Feb 15	<i>Scientific Principles I: Evidence-Based Science</i>	Homework 2 Due
5	Feb 20	<i>No Class- Study for Exam 1</i>	Review Exam 1 Study Guide
	Feb 22	Exam 1	
6	Feb 27	The Senses Part 1	Read/Watch <ul style="list-style-type: none"> • McGurk effect • The more you hear the less you hear • Curse of living without pain • Phantom Limbs
	Mar 1	The Senses Part 2	Read/Watch/Listen <ul style="list-style-type: none"> • A Matter of Taste • Hearing Red, Tasting Blue • Seeing in Tongues
7	Mar 6	The Senses contd.	
	Mar 8	Movement	Homework 3 Due Watch

			• Mirror Neurons
8	Mar 13	Spring Break!	
	Mar 15	Spring Break!	
9	Mar 20	Stress	Watch • 2-Minute Neuroscience: Hypothalamus and Pituitary Gland • 2-Minute Neuroscience: HPA axis
	Mar 22	<i>Scientific Principals II: Sources and the Neuroscience and Society Project</i>	Read Neuroscience and Society Project Assignment Sheet in Blackboard
10	Mar 27	Emotion	Homework 4 Due
	Mar 29	Blood and Barriers, Feeding and Motivation	Read/Watch • The Blood Brain Barrier (video and article) • What is Addiction? • 2-Minute Neuroscience: Nicotine
11	Apr 3	Spillover, Review	Review Exam 2 Study Guide
	Apr 5	Exam 2	
12	Apr 10	Learning and Memory	Watch • 2-Minute Neuroscience: Long-Term Potentiation • 2-Minute Neuroscience: Long-Term Depression
	Apr 12	Sleep and Circadian Rhythms	Listen/Do • Brains sweep themselves clean • Take the Morningness/Eveningness Questionnaire
13	Apr 17	<i>Scientific Principals III: Methods and Emerging Technologies</i>	Homework 5 Due Watch • Future You episodes (2) • Nature Video
	Apr 19	<i>Scientific Principals IV: Neuroethics</i>	Watch • Neuroethics- the BRAIN Initiative
14	Apr 24	Injury and Regeneration	
	Apr 26	Neurodegenerative Diseases	
15	May 1	TBD	
	May 3	Student Choice Lecture, Review	Neuroscience & Society Project Due Review Exam 3 Study Guide
Final Exam:		Wednesday, May 10, 10:30am - 1:15pm	