

Seminar in Neuroscience:
Biological Sex Differences in the Nervous System
NEUR 411_001: Fall 2024

Instructor: Dr. Patricia Sinclair

Instructor e-mail: psincla2@gmu.edu

Course Format: In person

Credits: 3

Office Hours:

Instructor Office Hours: Wednesday 1pm-2pm and by appointment in-person or Zoom

TA Office Hours: Tuesday 11am-12pm and by appointment in-person or Zoom

Office: Krasnow Room 217

TA: Yewande Oluwasiayo Oyesola

TA e-mail: yoyesola@gmu.edu

Classroom: Research Hall 202

Course Overview

This course explores nervous system characteristics that are impacted by sex differences including molecular and signaling mechanisms. We will analyze primary literature that examines biological sex as a variable in the nervous system of non-human models. In this course and per the World Health Organization definition, sex specifically refers to the biological and physiological characteristics of males and females including chromosomes, reproductive organs, and hormones while gender refers to social, cultural and psychological phenomena specific to humans.

This course fulfills the Writing Intensive (WI) requirement for the Neuroscience major

Writing intensive courses are required to assign a minimum of 3500 words, provide constructive feedback on drafts, and allow revision of at least one graded assignment. This course meets and exceeds this requirement through the 500-word news article, 2000-word research strategy, and 6 analysis papers (300-500 words each). Constructive feedback will be given on all assignments. You will be able to revise the news article and research strategy based on instructor and peer feedback before the final assignment is due.

Course Format/Delivery

This course is fully **in-person**, meaning you are required to attend class each week in this classroom. No recordings of lectures will be posted online; however, all instructional slides will be posted. Please be sure to attend each week as participation in discussions is an important component of the class and no make-up opportunities for participation grades are possible.

Learning Goals

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

- Examine, analyze, and interpret data from primary literature related to the nervous system
- Think critically about science and question scientific findings
- Clearly present, explain, and facilitate discussions about scientific data
- Communicate scientific data for a variety of audiences
- Evaluate and critique writing from your colleagues
- Effectively respond to edits and make changes in writing
- Develop a unique research idea and propose a strategy for its completion

Canvas Login Instructions

To access the course Canvas site, go to: lms.gmu.edu and log in with your Mason credentials. In the Dashboard or in Courses choose the Fall 2024 Seminar in Neuroscience box.

Textbook

No textbook is required. All primary research papers and accompanying supplemental material will be provided on Canvas.

Office Hours

Getting help is easy! In-person office hours will be held each week on **Wednesday 1pm-2pm** as stated above in **Krasnow Room 217**. Otherwise, please contact me to schedule an in-person or virtual meeting.

Grading and Assessments

There are **no exams** in this course. You will be assessed throughout the course based on a combination of quizzes, assignments, discussion boards, and participation.

Quizzes	10 %
Analysis Papers	20 %
Participation	10 %
News Article	15 %
Research strategy	25 %
Research Paper Presentation	10 %
Assignments*	10 %
*drafts, peer critiques, individual meeting attendance	

Total Grade **100 %**

Grading Scale:

A+ 98-100%	B+ 88-89%	C+ 78-79%	D 60-69%	F 0-59%
A 90-97%	B 80-87%	C 70-77%		

Assignment Details:

Quizzes: Quizzes on each lesson and/or article will be available on Canvas, open note, timed, and limited to a single attempt. Each quiz will be available from the end of class until it is due before the start of the next class. You will have 15 minutes once opened to complete the quiz. The *syllabus quiz* is not timed and should be taken until you receive 100%.

Analysis Papers: Each week you will read a research article and write an analysis paper **not to exceed 300 to 500 words**. The goal of these papers is to get you thinking about and summarizing science on a regular basis and to practice science writing principles with an emphasis on conciseness and clarity. Analysis papers will be submitted in Canvas and graded by the TA with constructive feedback.

Participation- After reading each research paper the group assigned to that article will present the paper and lead a discussion on the topic. Students who are not presenting will be required to speak at least once per discussion to receive full participation points. Questions and comments should demonstrate knowledge of specific aspects of the research article to receive full credit for the discussion.

News Article- You will write a 500-word review of a primary research paper in the style of a news article. It will be targeted to a non-scientist (general public) audience. This assignment will help you develop translational writing skills that are essential for disseminating scientific information to the public and other scientists. You are encouraged to use other articles/resources to support your analysis. If you choose to use outside resources, be sure to cite them within the text and provide a *separate* reference page.

Research Strategy- Based on previously published information, you will ask a novel neuroscience question and devise a 2-pronged research strategy to answer that question. Through this process you will learn how to conceive of future research and support your ideas. The complete research strategy will be *approximately* 2000 words and will serve as a capstone for the course. You will meet with me

individually to discuss the project ideas. You will submit a draft of your strategy which I will return to you with notes for editing. We will have an in-class peer review session before the final is due.

Research Article Presentation- Each of the 6 research articles will be assigned to a group of 3-4 people who will create a presentation and lead the discussion for that article. Everyone will fill out critiques assessing their colleagues' contribution to the final project. The results will be considered when assessing individual presentation grades. I will do the first presentation as to demonstrate expectations.

Assignments: Throughout the course there will be assignments graded for completion and effort. These include drafts and peer reviews for the news article and research strategy. There is one opportunity for extra credit: Neuroscience in the News. More information will be provided at the appropriate time.

Policies

Late Work: Late work will incur a deduction of 10% of the earned grade per day. This policy may be modified on an individual basis at the discretion of the instructor for emergencies and extenuating circumstances. You must contact the instructor in advance of the due date to request a modification of the late penalty.

Communication: If you need to contact me or the TA, please do so **from your university e-mail account only. Include the course name in the subject line and your name in the body of the e-mail.** Check your e-mail and course Canvas account daily. We will use e-mail and Canvas to communicate with you regarding changes to the course, syllabus, and other essential information. You are responsible for all announcements posted and sent via Canvas and e-mail.

Conduct: Be kind and respectful to your classmates. Disrespectful behavior including inflammatory and harmful language will lead to a potential deduction of points from the course.

Academic Standards

Academic Standards exist to promote authentic scholarship, support the institution's goal of maintaining high standards of academic excellence, and encourage continued ethical behavior of faculty and students to cultivate an educational community which values integrity and produces graduates who carry this commitment forward into professional practice.

As members of the George Mason University community, we are committed to fostering an environment of trust, respect, and scholarly excellence. Our academic standards are the foundation of this commitment, guiding our behavior and interactions within this academic community. The practices for implementing these standards adapt to modern practices, disciplinary contexts, and technological advancements. Our standards are embodied in our courses, policies, and scholarship, and are upheld in the following principles:

- **Honesty:** Providing accurate information in all academic endeavors, including communications, assignments, and examinations.
- **Acknowledgement:** Giving proper credit for all contributions to one's work. This involves the use of accurate citations and references for any ideas, words, or materials created by others in the style appropriate to the discipline. It also includes acknowledging shared authorship in group projects, co-authored pieces, and project reports.
- **Uniqueness of Work:** Ensuring that all submitted work is the result of one's own effort and is original, including free from self-plagiarism. This principle extends to written assignments, code, presentations, exams, and all other forms of academic work.

Violations of these standards—including but not limited to plagiarism, fabrication, and cheating—are taken seriously and will be addressed in accordance with university policies. The process for reporting, investigating, and adjudicating violations is [outlined in the university's procedures](#). Consequences of violations may include academic sanctions, disciplinary actions, and other measures necessary to uphold the integrity of our academic community.

The principles outlined in these academic standards reflect our collective commitment to upholding the highest standards of honesty, acknowledgement, and uniqueness of work. By adhering to these principles, we ensure the continued excellence and integrity of George Mason University's academic community.

Student responsibility: Students are responsible for understanding how these general expectations regarding academic standards apply to each course, assignment, or exam they participate in; students should ask their instructor for clarification on any aspect that is not clear to them.

Accommodations for Students with Disabilities

Disability Services at George Mason University is committed to upholding the letter and spirit of the laws that ensure equal treatment of people with disabilities. Under the administration of University Life, Disability Services implements and coordinates reasonable accommodations and disability-related services that afford equal access to university programs and activities. Students can begin the registration process with Disability Services at any time during their enrollment at George Mason University. If you are seeking accommodations, please visit <https://ds.gmu.edu/> for detailed information about the Disability Services registration process. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Email: ods@gmu.edu. Phone: (703) 993-2474.

Student responsibility: Students are responsible for registering with Disability Services and communicating about their approved accommodations with their instructor *in advance* of any relevant class meeting, assignment, or exam.

FERPA and Use of GMU Email Addresses for Course Communication

The [Family Educational Rights and Privacy Act \(FERPA\)](#) governs the disclosure of [education records for eligible students](#) and is an essential aspect of any course. **Students must use their GMU email account** to receive important University information, including communications related to this class. Instructors will not respond to messages sent from or send messages regarding course content to a non-GMU email address.

Student responsibility: Students are responsible for checking their GMU email regularly for course-related information, and/or ensuring that GMU email messages are forwarded to an account they do check.

Title IX Resources and Required Reporting

As a part of George Mason University's commitment to providing a safe and non-discriminatory learning, living, and working environment for all members of the University community, the University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities. Accordingly, **all non-confidential employees, including your faculty member, have a legal requirement to report to the Title IX Coordinator, all relevant details obtained directly or indirectly about any incident of Prohibited Conduct** (such as sexual harassment, sexual assault, gender-based stalking, dating/domestic violence). Upon notifying the Title IX Coordinator of possible Prohibited Conduct, the Title IX Coordinator will assess the report and determine if outreach is required. If outreach is required, the

individual the report is about (the “Complainant”) will receive a communication, likely in the form of an email, offering that person the option to meet with a representative of the Title IX office.

For more information about non-confidential employees, resources, and Prohibited Conduct, please see [University Policy 1202](#): Sexual and Gender-Based Misconduct and Other Forms of Interpersonal Violence. Questions regarding Title IX can be directed to the Title IX Coordinator via email to TitleIX@gmu.edu, by phone at 703-993-8730, or in person on the Fairfax campus in Aquia 373.

Student opportunity: If you prefer to speak to someone *confidentially*, please contact one of Mason’s confidential employees in Student Support and Advocacy ([SSAC](#)), Counseling and Psychological Services ([CAPS](#)), Student Health Services ([SHS](#)), and/or the [Office of the University Ombudsperson](#).

Student Services

- Learning Services (learningservices.gmu.edu)
- 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 Fall 2024 semester can be found on the [Mason Academic Calendar page](#).

Research Articles

- Gaignard P, Savouroux S, Liere P, Pianos A, Thérond P, Schumacher M, Slama A, Guennoun R (2015) Effect of Sex Differences on Brain Mitochondrial Function and Its Suppression by Ovariectomy and in Aged Mice. *Endocrinology* 156:2893–2904.
- Garner KM, Burton MD (2022) Sex-specific role of sensory neuron LKB1 on metabolic stress-induced mechanical hypersensitivity and mitochondrial respiration. *Am J Physiol Regul Integr Comp Physiol* 323:R227–R243.
- Knouse MC, Deutschmann AU, Nenov MN, Wimmer ME, Briand LA (2023) Sex differences in pre- and post-synaptic glutamate signaling in the nucleus accumbens core. *Biol Sex Differ* 14:52.
- Sarikahya MH, Cousineau S, De Felice M, Lee K, Wong KK, DeVuono MV, Jung T, Rodríguez-Ruiz M, Ng THJ, Gummerson D, Proud E, Hardy DB, Yeung KK-C, Rushlow W, Laviolette SR (2022) Prenatal THC Exposure Induces Sex-Dependent Neuropsychiatric Endophenotypes in Offspring and Long-Term Disruptions in Fatty-Acid Signaling Pathways Directly in the Mesolimbic Circuitry. *eNeuro* 9:ENEURO.0253-22.2022.
- Sertel SM, Blumenstein W, Mandad S, Shomroni O, Salinas G, Rizzoli SO (2021) Differences in synaptic vesicle pool behavior between male and female hippocampal cultured neurons. *Sci Rep* 11:17374.
- Zhang Y-D, Shi D-D, Zhang S, Wang Z (2023) Sex-specific transcriptional signatures in the medial prefrontal cortex underlying sexually dimorphic behavioural responses to stress in rats. *J Psychiatry Neurosci* 48:E61–E73.

Course Calendar
 NEUR 411-DL1, Fall 2024
 All due dates are Eastern Standard Time

Weeks	Presentations	Due Dates (by 1:30pm)
Week 1 Aug. 27	<ul style="list-style-type: none"> Welcome and introductions Review syllabus, course calendar Why this topic? Questions/discussion AI use 	
Week 2 Sept. 3	<ul style="list-style-type: none"> Scientific writing lecture Plagiarism Zotero (citations manager) Background Garner and Burton, 2022 	<ul style="list-style-type: none"> Article assignment Syllabus Quiz
Week 3 Sept. 10	<ul style="list-style-type: none"> Instructor sample presentation: Sex-specific role of sensory neuron LKB1 on metabolic stress-induced mechanical hypersensitivity and mitochondrial respiration (Garner and Burton, 2022) 	<ul style="list-style-type: none"> Analysis Garner and Burton Science writing and citations quiz
Week 4 Sept. 17	<ul style="list-style-type: none"> Sex-specific transcriptional signatures in the medial prefrontal cortex underlying sexually dimorphic behavioural responses to stress in rats (Zhang et al., 2023) 	<ul style="list-style-type: none"> Analysis & Quiz Zhang et al., 2023
Week 5 Sept. 24	<ul style="list-style-type: none"> Sex differences in pre- and post-synaptic glutamate signaling in the nucleus accumbens core (Knouse et al., 2023) 	Analysis & Quiz Knouse et al., 2023
Week 6 Oct. 1	<ul style="list-style-type: none"> Prenatal THC Exposure Induces Sex-Dependent Neuropsychiatric Endophenotypes in Offspring and Long-Term Disruptions in Fatty-Acid Signaling Pathways Directly in the Mesolimbic Circuitry (Sarikahya et al., 2022) News article introduction 	<ul style="list-style-type: none"> Analysis & Quiz Sarikahya et al., 2022
Week 7 Oct. 8	<ul style="list-style-type: none"> Talk about peer review 	<ul style="list-style-type: none"> Neuroscience in the news (extra credit 0-5pts)
Week 8 Oct. 15	<ul style="list-style-type: none"> Present research strategies assignment Peer review news article 	<ul style="list-style-type: none"> News Article Draft
Week 9 Oct. 22	Effect of Sex Differences on Brain Mitochondrial Function and Its Suppression by Ovariectomy and in Aged Mice (Gaignard et al., 2015)	<ul style="list-style-type: none"> News article final due Analysis & Quiz Gaignard et al., 2015 Time slot for individual meeting
Week 10 Oct. 29	<ul style="list-style-type: none"> Instructor meetings NO CLASS 	<ul style="list-style-type: none"> Instructor meetings NO CLASS
Week 11 Nov. 5	NO CLASS – PLEASE VOTE	!!!PLEASE VOTE!!!
Week 12 Nov. 12	<ul style="list-style-type: none"> Differences in synaptic vesicle pool behavior between male and female hippocampal cultured neurons (Sertel et al., 2021) 	<ul style="list-style-type: none"> Analysis & Quiz Sertel et al. 2021 Research strategies draft for <i>instructor</i> feedback
Week 13 Nov. 19	<ul style="list-style-type: none"> Peer review research strategy 	<ul style="list-style-type: none"> Research strategies draft for <i>peer review</i>

Week 14 Nov. 26	• Bio Sketch – to accompany the research strategy	• Bio Sketch (in-class)
Week 15 Dec. 3	• Final class.....TBD	• Final research strategy

NOTE: This schedule is subject to change at any time. You are responsible for all announcements and syllabus modifications posted to Canvas. Check your Mason e-mail and Canvas announcements daily.

*Sign up for individual meetings. Many individual meetings will be scheduled for our normal class time on October 29, but that is not enough time to meet with every student for 10-15 minutes. Additional timeslots will be made available when we approach the assignment.