

NEUR612/461
Bioscience, Neurotechnology and Society Fall 2023
(ONLINE)

Mon 1:30AM-4PM EST

NEUR 461/592

INSTRUCTOR: N KABBANI (nkabbani@gmu.edu)

COURSE SUMMARY: This course explores the implications of developments in basic and clinical neuroscience and biotechnology on society. In particular, advancements in digital imaging, biochemicals, brain-machine technologies raise important legal and ethical questions. The course will examine timely topics ranging from genetic modification to artificial intelligence. The course encourages critical thinking through an understanding of the science and its implications and human safety.

Success in this course is based on attendance and participation if you are unable to do so, please consider another course

LEARNING OBJECTIVES: The course is developed around *student-centered learning* where students work with one another to promote a space for knowledge acquisition and synthesis. This course is designed to provide students the opportunity to practice critical skills such as communication and collaboration. Through reading, writing, and discussion the student will gain knowledge and augment their understanding of science. In addition, the course enables students to learn to communicate on issues at the interface of science and society through oral presentation, critical thinking, and writing. By the end of the course, you will have gained strong knowledge on the science, technology, and its implications.

TEXTBOOK: All course-related material is provided via Blackboard.

SCHEDULE

8/21: Introduction
8/28: Aging and Regeneration / (approve Group article)(mitoch. Paper)
9/4: No Class Labor Day
9/11: HIV in Brain / Group 1 (Heather & Sura) (HIV tat)
9/18: Organophosphates and Nerve Agents / Group 2 (Liz & Helen) (organophos nerve agents)
9/25: Cannabinoids / Group 3 (Haroon/Yewande & Mohammad) (therap. Potential cannabis)
10/2: Opioids / Group 4 (Briguett & Sabina) (responding opioid crisis)
10/9: No Class Fall Break
10/16: No Class
10/23: No Class
10/30: Environmental Toxins and Human Health / Group 5 (Arsallan & Kyla) Research Report 1 Due (global synergistic actions to improve brain health)/ (micro plastics)
11/6: Biological Sensors / Group 6 (Ama & Ben) (micro/nano tech sensors)
11/13: No Class SFN Annual Meeting

11/20: Machine Behavior / Group 7a (Marwah & Andre) Group 7B (Ashley, Maadh, Latrice) (machine behavior)
11/27: Artificial Intelligence / Group 8 (Haroon & NK) (spatial topology of organelle)
12/4: Research Report 2 Due

GRADING:

1. Reading of weekly articles and in class attendance and participation is 40% of your grade.
2. Group presentation 20%
3. Two research report 40% @ 20% each. See below project description and grading rubric.

1. Weekly Reading and Discussion of the Articles in Blackboard: Each week will examine a topic. You are required to have read the weekly articles prior to class, and are encouraged to be active in discussing it. In addition, each of you will be asked the following questions-

What are some important take away points?
What are some outstanding questions?

2. Group Presentation: You will be divided into groups of 2-3 student and assigned a topic to present on. You must select a relevant article for your Group presentation by the second week of class (8/28) and approve it with the instructor. Presentations are expected to last 20-30 min and be comprehensive enough to cover all information within the article. There will be time for Q & A at the end of each Group presentation.

3. Research Reports: Write a research paper building on the existing literature and a synthesis of an original idea. This paper should be about 4-6 pages (double spaced). The goal is *not only to summarize but to also synthesize* an idea, concept, or theme based on what you have read. Think of this as an exercise in reading, deduction, and logic.

To do this:

1. Spend significant time gathering background information by reading the literature.
2. Begin to craft your idea(s) in the form of an outline.
3. Begin to write a first draft, use informative subheadings, figures, or flowcharts if needed.
4. Allow time to proof read your project. Make sure to create a complete list of citations and references throughout. Use a bibliography manager (e.g. Mendley) to format to any standard biblio style.

Grading Rubric for Research Papers:

50% Thoroughness of background research and data source identification
50% Final written report (25% content/accuracy; 25% structure/clarity)

Report 1 topic. Pick a scientist working in the field neurotoxin research and summarize his/her work citing major articles, contributions, and impact. Discuss his/her training and how they might have arrived at this work.

Report 2 topic. Pick a pesticide that is still in use. Described in both scientific and regulatory terms the impact of this pesticide on insects, plants, other organisms including humans. Who produces this specific pesticide and how much is it in use in the US ? Does the compound have any impact on the nervous system? Which and how?