

NEUR612/461/BIO691
Bioscience, Neurotechnology and Society Fall 2024
(ONLINE)

Thursday 10:30AM-1PM EST
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 on human safety. **Success in this course is based on attendance and participation. If you are unable to do so, please reconsider taking 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 scientific communication. 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, technology, and its implications.

TEXTBOOK: All course material is provided through Blackboard.

GRADING:

1. Weekly article participation is **40%** of your grade.
2. Your presentation is **25%**
3. Your report is **35%**.

1. Weekly Articles: Each week will examine a topic through reading an article and having an in-class discussion on it. You are required to read the article prior to class and to prepare 3 thought provoking questions to share with the class:

Question 1. Provide a knowledge question (e.g., I am curious if protein X also effects the liver...?)

Question 2. Provide an analysis question (e.g. why does the control group in figure 2 sill show an effect?)

Question 3. Provide a synthesis question (e.g., should the authors consider a longitudinal study as a a next step?)

2. Presentation: You will be assigned an article to present. The presentation should be comprehensive covering both the background information as well as data and information within the article. There should also be a conclusion section. Your presentation is expected to last about 45 min.

3. Report: Write a 6-8 page (double spaced) report (~ 1700 words) on a new technology or scientific study important for the treatment of a human neurodisease. Summarize in sufficient detail the scientific basis of this technology, how it was developed and how it is evolving. Discuss how it works

and which biological mechanisms it impacts. Also, discuss how this new technology enables innovation comparing its advantages and disadvantages to other existing products. **Do not use AI to write this report.**

Additional writing suggestions:

1. Start the assignment early in the semester.
2. Allow yourself time to gather background information and ideas.
3. Develop an outline.
4. Write a first draft with subheadings and figures or flowcharts if needed.
5. Allow yourself time to edit.
6. Use a bibliography manager (e.g. Mendley) to format to any standard biblio style.

Grading Ruberic for both Presentation and Reports:

50% Structure and clarify

50% Content (accuracy)

SCHEDULE (subject to change)

8/29: Introduction to the course and article assignments
9/5: HIV in the Brain Article “Retroviral infection of human Neurospheres” NK
9/12: HIV in the Brain Article “Retroviral infection of human Neurospheres ImmunoMetabolism Article “Fundamental Neurochemistry Review: Microglial immunometabolism” NK
9/19: Amyloids Part 1 Article “Physiological role of amyloid precursor protein” Sarah Wells
9/26: Amyloids Part 2 Article “Mechanisms and therapeutic potential of interactions between human amyloids and viruses” Marwah T
10/3: No Class
10/10: Discuss your topic and present an outline for the report
10/17: Fall Break No Class
10/24: Cellular Networks and Systems Article “Proteins, drug targets and the mechanisms they control” Trevor Hopf
10/31: Brain Imaging Article “In vivo mapping of pharmacologically induced functional reorganization” Cintia Martinez
11/7: Phytocannabinoids Article “The Basic Science of Cannabinoids” Katia McCuen
11/14: Cyanotoxins Article: “β-Methylamino-L-alanine substitution of serine in SOD1” Aresma
11/21: Aging and Senescence Article “Lessons from inducible pluripotent stem cell models on neuronal senescence” Sydney Collins
11/28: Thanksgiving No class
12/5: Report Due