

LIFS 3240 Introduction to Neurobiology

Course Outline - Spring 2023

1. **Instructor:** Dr. Julie Semmelhack (jsemmelhack@ust.hk)

2. Course Description

The course will introduce principles of neuroscience with a focus on the systems/neural circuit level. We will begin with the study of neurons: their structure, the propagation of action potentials and transfer of information between neurons. We then move to the sensory systems such as olfaction, hearing, and vision and discuss how external signals, e.g. light, are converted into neural signals, where these signals travel in the brain, and how they are processed. Next we study the control of movement. Finally, we cover the systems which control memory. Throughout the course, students will learn about new techniques such as functional imaging, optogenetics, and connectomics that are driving new discoveries in neuroscience. As part of the group project, students will learn how to read, evaluate, and present a scientific paper, a key skill in any research career, and also useful to anyone interested in public health or technology.

Credit Points: 3

Pre-requisite: LIFS 2040

3. Intended Learning Outcomes

Upon successful completion of this course, students should be able to:

No.	ILOs
1	Describe the mechanisms of sensory and motor systems.
2	Design neuroscience experiments using modern techniques.
3	Explain and evaluate a scientific paper.

4. Assessment Scheme

<u>Assessment</u>	<u>Assessing Course ILOs</u>
5% Problem Set	1, 2
30% Midterm	1, 2
25% Group project	3
40% Final	1, 2

5. Meeting Time and Venue

Venue: Rm 2404

Schedule: Monday and Wednesday 9:00 -10:20 am

6. Student Learning Resources

Required Textbook: M.F. Bear, B. Connors, M. Paradiso, "Neuroscience: Exploring the Brain," 4th Edition, Wolters Kluwer.

Two copies are on reserve at the Library, and online access is available through the library website; <https://ebookcentral.proquest.com/lib/hkust-ebooks/detail.action?docID=6175387&pq-origsite=primo>

Lecture slides will be posted on Canvas before lecture, and video of the lectures will be available.

7. Academic Integrity and Fairness

In order to ensure fair assessments, the University regulations on Academic Integrity (<http://ugadmin.ust.hk/integrity/regulations-1.html>) will be enforced.

8. Learning environment

Responsibilities of the Instructor

I will:

- Make every effort to build a valuable learning experience
- Work to ensure that exams and assignments are fair and helpful
- Respond to your feedback on how to make the course better
- Answer your questions respectfully

Responsibilities of students

I expect you to:

- Arrive on time (let me know ahead of time if you have to arrive late or leave early due to an unavoidable conflict)
- Avoid disturbing other students during lecture; silence phones, do not have side conversations
- Ask questions if anything is unclear
- Treat other student's questions with respect

9. Schedule

1. Overview; course organization, history of neuroscience – Feb 6
2. Neurons, glia and the resting membrane potential – Feb 8
3. The Action potential – Feb 13
4. Synaptic transmission – Feb 15
5. The Systems of Smell and Taste – Feb 20
6. The Eye, Photoreception – Feb 22
7. Problem set due. Midterm review (review problem set) Feb 27

8. Retinal circuits – Mar 1
9. Midterm – Mar 6
10. Visual cortex – Mar 8
11. The Auditory system – Mar 13
12. Vestibular system and Group project info; how to read and present a paper – Mar 15
13. Touch and temperature sensing – Mar 20
14. Group project session; attendance required – Mar 22
15. Spinal control of movement – Mar 27
16. Brain control of movement – Mar 29
17. Molecular and cellular mechanisms of memory – Apr 3
18. Memory Systems – Apr 12
19. Student presentations – Apr 17
20. Student presentations – Apr 19
21. Student presentations – Apr 24
22. Student presentations – Apr 26
23. Student presentations – May 3
24. Review Session – May 8