

BSE656A Neurobiology

3-0-0-0[9]

Course objective: The objective of the course is to introduce students to the field of neurobiology. Neurobiology touches upon many diverse areas -- from molecular organization of the nerve cells to the philosophy of mind -- and we will not (and cannot) cover all these areas in detail. Rather, we will aim to cover in the lectures the most fundamental topics, such as neuron structure, action potentials, and sensory systems, and then explore some of the frontier areas through the "team journal clubs". After completing this course, the students will gain an understanding of how a neuron functions and how neurons are connected together in circuits to form sensory or motor systems; they will also get a flavor of the ongoing research in this field and learn how to read and evaluate research articles.

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Office hour: Wed 11:45 am to 12:45 pm

Lectures: Wed, Fri: 10:30 - 11:45 am

Venue: L-15

Course Website: <https://piazza.com/iitk.ac.in/firstsemester2017/bse656a/home>

Google calendar for this course:

<https://www.google.com/calendar/embed?src=q1mnido7aqiicrbdvav5285i2o%40group.calendar.google.com&ctz=Asia/Calcutta>

Prerequisites

Basic understanding of electrical circuits (resistor, capacitor); high school level mathematics and chemistry; introductory biology (e.g. LIF101) or willingness to do required self-study.

Course Content

- Introduction to neuroscience, functions of different parts of the brain such as the cerebral cortex and the limbic system, motor system, reflexes (4)
- Membrane potential, action potential (6)
- Synaptic transmission, Glia (4)
- Sensory perception, vision, olfaction (8)
- Learning and memory, brain disorders (5)

Grading

Following the principle of continuous evaluation, the grading will be based on these components:

- 5 periodic quizzes, 8% each. Best 4 of 5 will be used for grading: 32% total.
- 1 mid-sem exam: 20%
- 1 end-sem exam: 25%
- Team Debates and Report: 15%
- Class participation and attendance: 8%

In the team debates, students will form teams. The instructor will select topics (debatable claims) related to current developments in the field. Each team will be assigned in advance to prepare a case “for” or “against” one claim. You must read and cite recent research papers to support your arguments.

Reports: The teams will prepare and submit a report on their topics (about 3 pages, including a brief introduction of the topic, and then the points of the team, with references to research papers). You must not copy sentences from the papers; any information you are taking from other sources should be first understood by you and then written in your own words (with citation to the original source). Do not try to copy and change one or two words here and there; copying will result in heavy penalty in marks for the whole team (some teams were penalized last year). You will get more marks for a brief but original report than a long but plagiarized one.

Classroom debates: After report submission, we will hold classroom debates where the two teams, one “for” and one “against” a claim, will present their arguments and challenge their opponents. The debates will be moderated by the instructor to ensure that all team members participate. The concepts covered in these debates will be included in the syllabus for subsequent quizzes and exams.

Break-up of the 15% marks for the debates:

- 6% for the report (all team members make the report together)
- 3% for effectively communicating their points in the debate (each team member will be allowed to speak and make a point in about 1-2 minutes in the beginning of the debate)
- 3% for effectively defending the claims during the debate
- 3% for effectively challenging the opposition's claims

Clarifications on debates: the goal of the debates is not to evaluate your communication skills. Rather, it is to see whether you have read recent research papers and thought carefully about the topic. I understand that some students have weak communication skills and have difficulty with English language. I will moderate the discussions so that these students can also present their points comfortably. It is not the case that one team will win and other will lose in the debate. Both competing teams can get high marks. The evaluation will be based on the points presented by each team (and that will depend mostly on how much reading and thinking the team has done).

The marks for class participation and attendance will be decided by the instructor based on the attendance (which will be taken only on randomly selected days) and the contribution to discussions in the classroom and on the course website.

Each quiz will cover material covered after the previous quiz. Each exam will cover material from the beginning of the course.

The copies will be rechecked only if a correct solution is marked incorrect. No requests for more partial marks will be entertained. If further mistakes are found in an answer during re-checking, marks will be reduced. No mercy pleas for better grades after the final exam will be entertained.

Home assignments

Reading assignments and problems will be provided periodically. These will not be graded, but students are strongly encouraged to attempt these for enhancing their learning.

Make-up policy

Quiz: If you miss one quiz (out of five conducted), you can be scored on the remaining four (but you lose the opportunity of ignoring your worst quiz). If you miss more than one, you will lose the corresponding marks. No make-up quizzes will be conducted, even if you have official leave sanctioned.

Attendance: Attendance will be taken on randomly selected days. No make-up or prorating will be possible, even if you have official leave sanctioned.

Team debates: The debates will be scheduled in advance after confirming the availability of all team members. If a student still misses it, he/she will lose corresponding marks and no make-up will be allowed.

Mid-sem: If a student is absent in the mid-sem with prior approval of the instructor, the end-sem can be weighted more to cover mid-sem marks (but remember that the end-sem will be harder as it covers more syllabus than the mid-sem).

End-sem: Missing end-sem is not allowed, and any circumstance that necessitates it should be discussed in advance with the instructor.

Code of Conduct

Any instance of cheating or any other academic fraud will invite very STRICT punishment (including change of grade and reporting to SSAC). No leniency will be shown in such a case, even if it is a first-time offense.

Reference Book

Principles of Neural Science (5th edition) by Eric Kandel et al.

The book is not compulsory, but students are encouraged to read it for learning the subject in more detail. The book is available in the library, and can also be found online.