



**Faculty of Engineering and Natural Sciences**  
**Neurobiology**  
**BIO423 and BIO523**  
**Fall 2024**

**Instructor:** Nur Mustafaoglu

**Email:** [nur.mustafaoglu@sabanciuniv.edu](mailto:nur.mustafaoglu@sabanciuniv.edu)

**Office:** FENS G001D

**Website:** <http://mustafaoglulab.com/>

**TAs:**

- Gülin Baran, Email: [gulinbaran@sabanciuniv.edu](mailto:gulinbaran@sabanciuniv.edu)
- Yeşim Erdoğan, Email: [yesim.erdogan1@sabanciuniv.edu](mailto:yesim.erdogan1@sabanciuniv.edu)

**Course Date and Address:**

15:40 pm – 17:30 pm	Wednesday	FENS	<b>G029</b>
10:40 am – 11:30 am	Friday	FASS	<b>G048</b>

**Office Hours:** by appointment!

Please make sure to schedule an appointment with the instructor and/or TAs prior the meeting.

**Objectives:**

The study of the nervous system and its elements, such as neurons and neural pathways, and how these mechanisms mediate behavior is called neurobiology. It is a broad and rapidly evolving field in biology. This course is designed to provide students with an in-depth understanding of molecular and cellular neurobiology, as well as a basic understanding of general neurobiology. Emphasis is placed on mammalian neurobiology, particularly humans. The first part of the course covers neuroanatomy and essential neurocellular signaling pathways, including chemical and electrical signaling and neurotransmission. The course then looks at how the nervous system develops, how it behaves during everyday activities, and how it is disrupted by injury and disease. The course also covers emerging neuroscience research techniques.

**Learning Outcomes:**

A student who successfully fulfills the course requirements will be able to demonstrate:

- 1) describe the structure and function of neurons and glia cells
- 2) explain how the nervous system is established and how neurons are connected in neuronal circuits that control bodily functions and behavioral output
- 3) describe the central nervous system, the autonomous nervous system and the peripheral nervous system including the structure and function of the sensory organs and the motor systems. Describe and analyze how the interactions between these neuronal systems via various neurotransmitters influence the functions of the body
- 4) explain molecular and cellular mechanism disfunctions in neurodegenerative diseases
- 5) analyze a given theoretical problem/case, identify gaps in knowledge and retrieve knowledge from relevant scientific literature
- 6) give an account for basic and advanced neurobiological techniques
- 7) identify and apply a suitable method theoretically or practically to address the research question at hand
- 8) compile and present a literature study and develop an ability to critically analyze and discuss science by reviewing texts in public and scientific papers
- 9) identify and discuss ethical issues related to scientific activities.

## Course Materials:

Main Book:

- Principles of Neurobiology, Second Edition, CRC Press Taylor & Francis Group  
Liqun Luo  
ISBN: 9780367514716

Additional Sources:

- From Neuron to Brain, Fifth Edition, Sinauer Associates, Inc.  
John G. Nicholls, A. Robert Martin, Paul A. Fuchs, David A. Brown, Mathew E. Diamond, David A. Weisblat  
ISBN: 9780878936090
- Review articles
- Research articles
- Some additional reading materials and videos will be shared on SuCourse

## Weekly Plan

Week 1	27/09/2024	Meeting and Course Introduction	
Week 2	02/10/2024	An Invitation to Neurobiology and Anatomy of the Nervous System	Principles of Neurobiology: Chapter 1 and 13
	04/10/2024		
Week 3	09/10/2024	Signaling within Neurons - <b>Last day of group declarations</b>	Principles of Neurobiology: Chapter 2
	11/10/2024		
Week 4	16/10/2024	Properties and Functions of Neuroglial Cells	From Neuron to Brain: Chapter 10
	18/10/2024	Glial Cells and the Blood-brain barrier	
Week 5	23/10/2024	Signaling across Synapses	Principles of Neurobiology: Chapter 3
	25/10/2024		
Week 6	30/10/2024	<b>Midterm-I</b>	
	01/11/2024	No class – EMBO Meeting	
Week 7	06/11/2024	Brain Disorders: Neurodegenerative Disorders	Principles of Neurobiology: Chapter 12
	08/11/2024	<i>Student Presentations – Group 1</i>	
Week 8	13/11/2024	Brain Disorders: Neurodegenerative Disorders	Principles of Neurobiology: Chapter 12
	15/11/2024	<i>Student Presentations – Group 2</i>	
Week 9	20/11/2024	Brain Disorders: Neurodevelopmental Disorders	Principles of Neurobiology: Chapter 12
	22/11/2024	<i>Student Presentations – Group 3</i>	
Week 10	27/11/2024	Brain Disorders: Psychiatric Disorders	Principles of Neurobiology: Chapter 12
	29/11/2024	<i>Student Presentations – Group 4</i>	
Week 11	04/12/2024	<b>Midterm-II</b>	
	06/12/2024	<i>Special Lecture on Patch Clamp Technique: Gulin Baran</i>	
Week 12	11/12/2024	Ways of Exploring: Animal models and Behavioral Analysis	Principles of Neurobiology: Chapter 13
	13/12/2024	<i>Student Presentations – Group 5</i>	
Week 13	18/12/2024	Ways of Exploring: Genetics and Molecular Techniques	Principles of Neurobiology: Chapter 13
	20/12/2024	<i>Student Presentations – Group 6</i>	
Week 14	25/12/2024	Ways of Exploring: Computational Models	Principles of Neurobiology: Chapter 13
	27/12/2024	<i>Student Presentations – Group 7</i>	

## Grading Policy:

**Homework 15%:** There will be 3 homework assignments throughout semester

- Homework due dates will be announced for each homework.
- Late assignments: 10% late penalty will be implemented for up to 3 days. Homework submitted 3 days later than the due date will not be accepted; students' grade will be 0 for that assignment.

**Midterms (2x20%):** There will be two midterms:

**Midterm 1:** Students will be responsible for the material of week 1-5

**Midterm 2:** Students will be responsible for the material of week 7-10

**Final (25%):** Students will be responsible for the whole material of the course.

**In-class performance (5%):**

- There will be short questions during the lectures
- Timing of the questions can be different in each lecture

**Presentations (15%):**

- There will be 7 presentations during the course semester
- Presentations will be performed as groups (3-6 people in each group)
- **Important!** Last day of declaring a group will be **09/10/2024**.
- Students will present a research paper
- **Important!** The research papers should be approved by the lecturer, at least 1 week advance from the lecture time
- **Important!** Each student must read the papers that will be presented
- **Important!** Each group should send their presentation materials (slides) to the lecturer a day before the presentation by midnight.
  - 1/3 of the presentation grade is the presentation material.
  - Please do not forget to send it to the instructor on time!
- Grading of the presentations (15 pts):
  - Presentation materials: 5 pts
  - Presentation (explaining the concepts): 5 pts
  - Answering questions: 5 pts
- Tentative Grade Scale:

Highest	Lowest	Letter
100.00 %	93.00 %	A
92.99 %	87.00 %	A-
86.99 %	83.00 %	B+
82.99 %	77.00 %	B
76.99 %	73.00 %	B-
72.99 %	67.00 %	C+
66.99 %	63.00 %	C
62.99 %	57.00 %	C-
56.99 %	53.00 %	D+
52.99 %	50.00 %	D
49.99 %	0.00 %	F

**Exam Policy:**

- Exams may include multiple choice, fill-in-the-blank, problem solving, or short answers.
- All exams will be closed book and held in class.
- For exams you will only require a pencil and a calculator.
- Phones are not allowed and must be turned off.
- If you leave during an exam, you will not be allowed back in
- Late arriving students will not be allowed after the first student finishes the exam and leaves.

**Grade disputes**

- Students will have one week after the return of an exam or an assignment to challenge a grade for any question with a written note providing an explanation.
- Failure to challenge the grade within this period indicates a willingness to accept the grade as is.
- The challenge should consist of a written description of why the answer is correct based on other published material that you cite.

**Academic Honesty:**

- All students must follow the university guidelines of academic integrity.  
<https://www.sabanciuniv.edu/en/academic-integrity-statement>
- A strict zero-tolerance policy for cheating will be enforced.