

Course number		U-LAS70 10002 SE50				
Course title (and course title in English)	ILAS Seminar-E2 :Physiological Neuroscience ( 生理学の神経科学 ) ILAS Seminar-E2 :Physiological Neuroscience		Instructor's name, job title, and department of affiliation		Graduate School of Medicine Assistant Professor,RAUDZUS , Fabian	
Group	Seminars in Liberal Arts and Sciences		Number of credits		2	Number of weekly time blocks 1
Class style	seminar (Face-to-face course)	Year/semesters	2025 ・ First semester		Quota (Freshman)	15 (15)
Target year	Mainly 1st year students	Eligible students	For all majors		Days and periods	Wed.5
Classroom	24, Yoshida-South Campus Bldg. No. 1				Language of instruction	English
Keyword	Brain (脳) / Spinal cord (脊髄) / Neuron (ニューロン) / Neurogenesis (神経発生)					
[Overview and purpose of the course]						
<p>Welcome to the fascinating world of "Physiological Neuroscience"! Have you ever wondered how our incredible brain enables us to think, see, hear, and move? This seminar will unravel the mysteries of our body's ultimate control center.</p> <p>In our initial sessions, we'll learn about the basic structure of the brain and get to know the building blocks, called neurons. We'll zoom in on these neurons, paying special attention to their membrane proteins like ion channels and receptors. These proteins play an important role in creating electrical signals by establishing ion gradients.</p> <p>After understanding these essential mechanisms, we'll explore how these signals travel, facilitating communication between neurons. As the course progresses, we'll delve into the brain's development and learn how neurons establish the right connections, like wiring a complex network.</p> <p>In our final sessions, we'll explore the functions of different brain structures and specialized neurons, allowing us to understand how we perceive the world around us - from seeing and hearing to sensing pain. Throughout each seminar, you'll not only gain insights into the brain's fundamental properties and functions but also explore disruptions caused by various diseases, medications, substances, or toxins. This knowledge will equip you with valuable tools to comprehend related issues on a deeper level.</p> <p>Get ready for an engaging journey into the wonders of the brain!</p>						
[Course objectives]						
<p>By the end of this seminar, you'll uncover the fascinating world of neurons and how they communicate. We'll dive into exciting medical and biological aspects of neuroscience, giving you a well-rounded perspective. Plus, you'll gain the skills to engage in stimulating discussions about the latest advancements in the field, regardless of your academic background. This seminar offers an eye-opening journey into the wonders of the brain!</p>						
[Course schedule and contents)]						
1. Introduction to Neuroscience 2. What is a Neuron? 3. The Important Role of Ion Channels 4. How Can a Neuron Sense an External Signal? Receptors						
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5. A Matter of Concentration: Ion Gradients and the Membrane Potential
  6. Time for Action: The Action Potential
  7. Worksharing Within the Neuron: Neuronal Polarity and Subcellular Specialization
  8. Neuron Conversations: How Brain Cells Communicate
  9. How is the Message Delivered from One Neuron to the Other? Neurotransmitter
  10. The Development of the Brain: Neurogenesis
  11. How to Connect the Wires? Axon Guidance and Neuronal Regeneration
  12. Through the Eye to the Brain: Understanding Vision
  13. Can You Hear Me? The Auditory System
  14. "Ouch!" How We Sense Pain
  15. Feedback

Changes in order and/or content might occur.

#### **[Course requirements]**

The course is open to all students, but a basic understanding of biology is recommended.

#### **[Evaluation methods and policy]**

Attendance and active participation: 20%

Midterm assignment: 40%

Presentation: 40%

#### **[Textbooks]**

Not used

#### **[References, etc.]**

##### **( References, etc. )**

Mark F. Bear, Barry W. Connors, Michael A. Paradiso 『Neuroscience: Exploring the Brain』 ( Jones & Bartlett Learning, April 8, 2020 ) ISBN:9781284211283 ( Enhanced 4th Edition (English Edition) )

Additional literature and Massive Open Online Courses (MOOCs) will be introduced during the seminars.

#### **[Study outside of class (preparation and review)]**

To make the most of each seminar, it's essential to be prepared. This involves reviewing the previous session, working through any questions, and independently studying the upcoming subject. Expect to spend around 60-90 minutes getting ready.

#### **[Other information (office hours, etc.)]**

For a deeper understanding of neuroscience, it's advised to attend the "Disorders of the Nervous System" seminar. This will provide additional insights into the field.

If you have further questions, feel free to write me an email.