

<b>Course number</b>		U-LAS70 10002 SE50					
<b>Course title (and course title in English)</b>		ILAS Seminar-E2 :Biochemistry Principles ( 生化学の塾 ) ILAS Seminar-E2 :Biochemistry Principles		<b>Instructor's name, job title, and department of affiliation</b>		Graduate School of Medicine Senior Lecturer,Erik WALINDA	
<b>Group</b>		Seminars in Liberal Arts and Sciences		<b>Number of credits</b>		2	<b>Number of weekly time blocks</b>
							1
<b>Class style</b>		seminar (Face-to-face course)		<b>Year/semesters</b>		2025 ・ Second semester	
						<b>Quota (Freshman)</b>	
						12 (12)	
<b>Target year</b>		Mainly 1st year students		<b>Eligible students</b>		For all majors	
						<b>Days and periods</b>	
						Thu.5	
<b>Classroom</b>		22, Yoshida-South Campus Bldg. No. 1				<b>Language of instruction</b>	
						English	
<b>Keyword</b>		Medical biochemistry-related / Molecular Biology / Chemistry / Physiology / Biochemistry					
<b>[Overview and purpose of the course]</b>							
<p>This seminar is designed to deepen students' understanding of key biochemical concepts by actively engaging them in discussions, problem-solving, and interactive learning. It complements the lecture "Introduction to Biochemistry" by providing an opportunity to review, discuss, and clarify the lecture content in a more personalized and interactive setting.</p> <p>The primary purpose of this seminar is to ensure that students fully comprehend the material presented in the lecture, with an emphasis on critical thinking and practical application (we also cover additional topics not discussed there). Through quizzes, exercises, and case studies, students will strengthen their grasp of complex biochemical topics and improve their problem-solving skills.</p> <p>Unlike a traditional lecture, this seminar focuses on active student participation, including:</p> <ul style="list-style-type: none"> <li>* Group discussions to solve complex biochemical problems.</li> <li>* Frequent (ungraded) quizzes for self-evaluation and interactive exercises to reinforce understanding.</li> <li>* Case studies that connect biochemical concepts to real-world applications.</li> <li>* Peer teaching to encourage collaborative learning.</li> </ul> <p>Students are encouraged to ask questions at any time - during class, by email, or in additional meetings with the instructor or teaching assistants. The seminar is conducted entirely in English, providing students with the added benefit of improving their scientific communication skills in a foreign language.</p> <p>---</p> <p>In brief:</p> <p>This seminar acts as a "tutorial" for the "Introduction to Biochemistry" lecture, offering a supportive environment where students can review content, ask questions, and engage deeply with the material. The Japanese subtitle 生化学の塾 reflects the seminar ' s purpose as a study group aimed at mastering biochemistry.</p>							
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### [Course objectives]

As all matter is composed of atoms, modern life science aims to explain all aspects of life comprehensively from the atomic level to that of the entire organism. In this seminar, students will attain a profound understanding of the atomic design of life, that is how (at the scale of individual atoms) biomolecules work and join forces to fulfill virtually all actions exerted by living beings in both health and disease.

By the end of this seminar, students should be able to:

- \* Explain the structure and function of key biomolecules such as DNA, proteins, and lipids.
- \* Analyze biochemical reactions, including enzyme kinetics and metabolic pathways.
- \* Apply molecular biology techniques such as PCR, DNA cloning, and protein analysis.
- \* Critically assess how biomolecules contribute to cellular function and organismal health.

### [Course schedule and contents]

1. Introduction to Biochemistry: Overview of the molecular basis of life.
2. DNA, Genes, and Genomes: Genetic information storage and transmission.
3. DNA Replication and Gene Expression: Mechanisms of heredity and protein synthesis.
4. Proteins: Structure and functional roles in cells.
5. Protein Structure: Insights from protein folding to function.
6. DNA Isolation and Analysis: Techniques used in molecular biology labs.
7. DNA Cloning and PCR: Manipulating DNA for research and medical purposes.
8. Protein Methods: Methods for analyzing and characterizing proteins.
9. Enzymes: Catalysts of life, their mechanisms and applications.
10. Enzyme Kinetics: Quantitative analysis of enzyme behavior.
11. Carbohydrates: Energy sources and structural molecules.
12. Lipids: Membrane structure and energy storage.
13. Metabolism: Central pathways of energy production.
14. Citric Acid Cycle and Oxidative Phosphorylation: Key pathways in cellular respiration.

Total:14 classes and 1 feedback

### [Course requirements]

None

### [Evaluation methods and policy]

Class Participation (discussion, in-class quizzes) [60%]

Homework and problem sets [40%]

### [Textbooks]

Berg, Tymoczko and Stryer 『Biochemistry (any edition)』 ( W. H. Freeman and Co. ) ISBN:978-1-4292-7635-1

You do not have to buy the textbook as it is available at the library.

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

Students should review course material and complete problem sets before each seminar. A detailed reading schedule and a list of supplementary online materials will be provided at the beginning of the course.

It is helpful to have some prior knowledge in general chemistry, organic chemistry, biology, or biochemistry.

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Alternatively, students who have taken or are taking "Introduction to Biochemistry", or any similar biology-related course, will find the material more accessible.

However, taking that lecture is not necessary. Students can succeed in this seminar by preparing thoroughly with the instructor's notes, provided textbook, handouts, and independent learning videos. All necessary materials will be available to ensure that motivated students can fully engage and perform well.

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

Office hour: any time (please send an email before coming to the office) or online (zoom etc.)

### **[Essential courses]**