

Language: English

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2021 Academic Year Course Description and Syllabus

Course Name	Instructor Name
Metabolic Biochemistry(2credits) [SESI461]	Akira Togayachi

Course numbers are displayed in blue color after course names.

Semester Spring Semester

General Description

The substances that make up living organisms are lifeless molecules. In this class, you will learn how these substances change and interact with each other in the living body, and how life is maintained, focusing on the metabolism and regulation performed in the living body. Specifically, lectures on the following contents will be given.

- (1) Energy metabolism: A system that extracts energy compounds from sugars, lipids, and proteins.
 - (2) Biosynthesis of compounds synthesized using carbohydrates, lipids, and amino acids that make up the body.
 - (3) Hormones that regulate the metabolism of the body and related diseases.
- Lecture materials will be distributed in print.

Goals and Objectives

Understand the important metabolism in the body together with the compounds, and understand that the various metabolisms in the body are not independent but linked to each other.

General Education / Faculty Courses: Most relevant Learning Outcomes for this course.

- Students are able to learn the knowledge necessary in the specialized field and utilize it.
- Students are able to have an inquiring mind/intellectual curiosity and collect the related knowledge from a wide range of information media.
- Students are able to analyze the issues/problems and solve them through critical/creative thinking.
- Students are able to communicate with each other in a group.
- Students are able to properly describe opinions and claims of their own.
- Students are able to actively take an action under their self-management and display their leadership.
- Students are able to have a sense of ethics and be aware of the social contribution and responsibility.
- Students are able to be conscious of their contribution to the international communities.

Instructor has work experience in the relative field of this course.

Yes

Years and/or months of work experience

25 year(s)

Course Syllabus

	Content	
Class 1	Lecture contents	Guidance (about lecture contents and evaluation)
	Self-study Assignments	Review on cell structure and biomolecules
Class 2	Lecture contents	Introduction to metabolic biochemistry Compounds that constitute biological components
	Self-study Assignments	Review of chemical structures such as compounds made from carbohydrates, lipids and amino acids
Class 3	Lecture contents	Enzymes and coenzymes
	Self-study Assignments	About the difference between enzymes and coenzymes
Class 4	Lecture contents	Overview of energy metabolism in living organisms Energy metabolism (1) 1)Glycolysis 2)Citric acid cycle
	Self-study Assignments	Learn ATP as an energy currency
Class 5	Lecture contents	Energy metabolism (2) 1)Electron transfer system 2)Oxidative phosphorylation
	Self-study Assignments	Review of glycolysis and citric acid cycle
Class 6	Lecture contents	Energy metabolism (3) 1)Pentose phosphate circuit 2)Gluconeogenesis 3)Carbohydrate metabolism
	Self-study Assignments	A small test Review of Electron transfer system
Class 7	Lecture contents	Energy metabolism from lipids Fatty acid biosynthesis and beta-oxidation
	Self-study Assignments	Learn about lipid compounds that can be used as energy
Class 8	Lecture contents	Biosynthesis of lipid components 1)Phospholipids, prostaglandins, cholesterol, etc. 2)Vitamin, steroid hormone
	Self-study Assignments	A small test What a kinds of lipids are produced in the living body
Class 9	Lecture contents	Biosynthesis of lipid components (2) 1) Transport of lipids 2) Lipid signal transduction
	Self-study Assignments	Review lipid
	Lecture contents	Amino acid metabolism 1) Amino acid synthesis and degradation, heme synthesis 2) Biological components synthesized from amino acids

Class 10		3) The role of amino acids
	Self-study Assignments	Learn what substances are synthesized from amino acids
Class 11	Lecture contents	Biological metabolism 1) nucleotide A small test
	Self-study Assignments	Learn about nucleotides
Class 12	Lecture contents	Biological metabolism 2 1) Vitamins and minerals 2) Metabolism of glycoconjugates (glycolipids, glycoproteins) A small test
	Self-study Assignments	Review of metabolism
Class 13	Lecture contents	Hormonal regulation 1) Types of hormones 2) Hormone biosynthesis and action, signal transduction
	Self-study Assignments	Learn hormones and biologically active substances Report issues will be presented. (It will be considered together with the progress of the lecture.)
Class 14	Lecture contents	Organs / cells and metabolism 1) Cells (proliferating cells, cancer, etc.) and metabolism, etc. 2) Summary of metabolism and biosynthesis Summary so far 3) Metabolism and disease 4) Analysis technology A small test
	Self-study Assignments	Review metabolism
Class 15	Lecture contents	Canceled due to online lecture schedule.
	Self-study Assignments	

Evaluation/Assessment

Assessment	Percentage	Evaluation Criteria (Explanation)
Final Exam	70%	
Midterm		
Papers		
Performance/Works		
Continuous Assessment (quizzes, assignments, etc.)	30%	Overall judgment will be made based on class attendance, quizzes/assignments that will be given at irregular intervals.
Other		

Remarks about grading	A total of 100 points will be awarded, including the final exam and Continuous Assessment.
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Grading Method:ABC

Course Materials

Basically, the designated textbooks will not be used, and prints according to the lecture will be distributed, but it is recommended that you have any textbooks as below.

Reference Materials

1. ヴォート著 (田宮信雄ら訳著) 「ヴォート 生化学」 第4版 (上・下) 東京化学同人
2. レーニンジャー・ネルソン・コックス著 (川寄敏祐監修) 「レーニンジャーの生化学」 第6版(上・下) 廣川書店
3. ヴォート著 「基礎生化学」 東京化学同人
4. 畑山 巧【編著】 「ベーシック生化学」 化学同人 2009年

Advice for Prospective Students

It is recommended that students study biochemistry before this class. Furthermore, it may be difficult to understand a lecture without knowledge of the structure of the compounds that make up the living body.

Estimated time to prepare and to review for each class session. (incl. assignments, tests, papers, etc) : 3hrs 30mins

Implementation of Active Learning

No

Will you use ICT for class or to support self-learning?

No

How to give feedback for assignments (mid-term exams, reports, etc.)

Correct and return tests or reports.

Language used in class

Japanese

Instructor Profile

Togayachi has been interested in analysis of biological functions of glycans and its application to disease mechanisms, and has been involved in research and development.

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