Functional Biology

Syllabus Number 2J261

Special Subjects
Elective 2 credit

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1. Course Description

It is important to study the hierarchy of molecules, cells, tissues, organs, and individuals. In order to link the knowledge of molecules and cells learned in "Biology" and "Cell biology" to the acquisition of "Animal physiology" and "Biosystems dynamics", students will study the hierarchy from cells to individuals in this course. How cells of the nervous and immune systems work to maintain the life of an individual, and how mechanism of signal transduction between cells, tissues, organs, and individuals, the lecture will be given with the latest research topics. In this course, while conducting group work and presentations, students will acquire knowledge and develop comprehensive thinking ability, problem solving ability, and communication ability on DP1, DP2, and DP3.

2. Course Objectives

The goal of this course is to understand the structure and function of the cells that form tissues and organs, and to understand the life phenomena of individuals that consist of the cooperation of cells, tissues and organs. Students can describe the technical terms learned in each lecture and combine their knowledge and solve the exercises given in each lecture. In addition, students can identify issues of life phenomena themselves and present the results verbally through group work.

3. Grading Policy

Evaluation is comprehensively conducted on the results of the regular examination (80%) and the presentation of the assignment (20%). A score of 60% or more is passed. Regular examination can be taken regardless of attendance rate, but students with attendance rates of less than 60% (less than 9 lectures) will not qualify for re-examination. After the examination, I will explain some of its contents.

4. Textbook and Reference

Textbook
和田勝著　基礎から学ぶ生物学・細胞生物学（第4版）　羊土社（ISBN978-4-7581-2108-8）
Reference
東京大学生命科学教科書編集委員会編　理系総合のための生命科学（第5版）　羊土社（ISBN978-4-7581-2102-6）

5. Requirements(Assignments)

Review the "biology" and "cell biology" that you learned in the first grade in advance. For each lecture, read the textbook page shown in each lecture below in advance. Do the preparatory study for about 1 hour. Read the textbook of the next lecture and write down what you understood and what you did not understand in a notebook. Review for about an hour. Focus on LMS and prints, especially review the points that you did not understand during the preparation, and write down in a notebook whether you understood. Review the exercises you did during the lecture. If students do not understand, they will need to take appropriate measures such as reading the textbook again, reviewing the lecture contents with the LMS, and asking the teacher questions. For group work, please prepare for the presentation such as presentation drawings and manuscript preparation in advance.

6. Note

I strongly recommend to take this course for students who wish to take "Experiments in Animal Physiology" and students who wish to have an Animal Research Laboratory in graduation research. The textbook pages shown in each lecture below are from the 4th edition. When using the 3rd edition, please note the corresponding page as the page will differ. There is no big difference in content between the 3rd and 4th editions.
Distribute the print if necessary. After each lecture, the contents of the lecture will be posted on the LMS.

7. Schedule

[1] Introduction to Functional Biology: Review of Cell Biology
Textbook: Chapter 2. Profile of cells (P49-54, P66-73)

[2] Birth of life: The basis of embryology
Textbook: Chapter 8. The road to multicellular organisms 3 (P196-204)

[3] Structure and function of the human body: The basis of anatomical physiology
Cardiovascular system, respiratory system, digestive system, urinary system

[4] Neuroscience 1: Cells that compose the brain
Textbook: Chapter 11. Organized as an individual(P280-287)

[5] Neuroscience 2: Brain formation and functional area
Cerebral cortex, cerebellum, hippocampus, striatum, amygdala

[6] Immunology 1: Cells that control immunity
Textbook: Chapter 9. The immune system to protect individuals（P214-215、P224-245）

[7] Exercise and Summary:
I will give review the contents of the first to sixth lectures while solving the exercises.

[8] Immunology 1: Crosstalk between intestinal immunity and intracerebral immunity
Effectiveness of probiotics and prebiotics

[9] Diseases caused by abnormalities in cells, tissues, and organs 1
Nerve system diseases and disorders (neurodegenerative diseases, psychiatric disorders, developmental disorders)

[10] Diseases caused by abnormalities in cells, tissues, and organs 2
Immune system diseases (autoimmune diseases, allergies), cancer, lifestyle-related diseases

[11] Diseases caused by abnormalities in cells, tissues, and organs 3
I will give group work and presentations, including questions and answers

[12] Signal transmission between cells, tissues, and individuals as seen from biological signals
Vital signs, voluntary movements, reflex movements

[13] Neuroscience and Psychology topics (possibly an outside lecturer)

[14] Exercise and Summary:
I will give review the contents of the lectures so far while solving the exercises, and group work and presentations, including questions and answers.

[15] Examination and Commentary:
I will give examination and explain some of its contents.