

Animal Physiology

Syllabus Number

5J250

Special Subjects

Elective 2 credit

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1. Course Description

Students will study the physiological function of neuronal cells, the role of hormone, and immune system, including innate and adaptive immune systems. Since the lecture includes the practice session, students will confirm their own degrees of understanding. In this lecture, students will acquire knowledge and train comprehensive thinking skill on DP1 and DP2.

2. Course Objectives

Animal physiology is the study of biological processes within living organisms. The research area of animal physiology is closely related to neurology, endocrinology, and immunology. The goal of this lecture is to understand the mechanism of maintaining homeostasis in living organisms. Students can describe the technical terms learned in each lecture. In addition, students can combine their knowledge and solve the exercises given in each lecture.

3. Grading Policy

Evaluation is conducted on regular examination results. 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 courses) will not qualify for re-examination. After the examination, I will explain some of its contents.

4. Textbook and Reference

Textbook

There is no textbook.

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(ISBN 978-4-7581-2102-6)

和田勝著 基礎から学ぶ生物学・細胞生物学(第3版) 羊土社(ISBN 978-4-7581-2065-4)

鈴木隆二著 免疫学の基本がわかる事典 西東社(ISBN 978-4-7916-1939-9)

坂井建雄、久光正監修 脳の事典 成美堂出版(ISBN 978-4-415-30999-6)

5. Requirements(Assignments)

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.

6. Note

Students use the distributed prints. After each lecture, the contents of the lecture will be posted on the LMS.

7. Schedule

- [1] Introduction to Animal Physiology: Review of Biology and Cell biology
Outline of the maintenance mechanism of homeostasis that is the foundation of this course.
- [2] Structure and Function of Cells: Organelles and Energy metabolism
Review the basics learned in Cell biology and Biochemistry.
- [3] Gene Expression: Transcription and Translation
Review the basics learned in Cell biology and Biochemistry.
- [4] Nervous system 1: Types and Functions of Nerve cells
Cellular structure and function of neurons and glial cells based on the latest research data.
- [5] Nervous system 2: Sense and Motor function
Hierarchical structure of the brain that conveys somatosensory senses, special senses (hearing, vision), and motor skill.
- [6] Exercise and Summary:
Review the contents of the first to fifth lectures while solving the exercises.
- [7] Nervous system 3: Higher brain function (memory, learning, cognition, emotion)
Molecular mechanisms of memory and learning in the hippocampus, and express systems of emotion centered on the limbic system.
- [8] Biological rhythm: Thermoregulation and Sleep regulation
Molecular mechanisms that regulate body temperature and sleep.
- [9] Endocrine system: Type and Function of Hormone
Hormonal functions and mechanisms of secretion regulation.

- [10] Exercise and Summary:
Review the contents of the first to ninth lectures while solving the exercises.
- [11] Immune system 1: Type and Function of Immune system cells
Physical, chemical and biological defense mechanisms.
- [12] Immune system 2: Defense mechanism (natural immunity and acquired immunity)
Differences and functional significance of innate immunity and acquired immunity.
- [13] Immune system 3: Cell-mediated immunity and Humoral immunity
Acquired immunity, allergies and immune tolerance.
- [14] Animal physiology and Life sciences
Introduce the latest topics of the nervous system and immune system. Example: Disease model mouse produced by using gene modification technology and cancer immunotherapy.
- [15] Examination and Commentary:
I will give examination and explain some of its contents.