

Plant Physiology

Syllabus Number

5I264

Special Subjects

Elective 2 credit

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1. Course Description

Plant physiology is a basic field of plant science, and it concerns wide range of view from molecular level to individual level.

This course covers the followings:

1. Major biological characteristics of plants are compared with those of the other kinds of living things.
2. Basic knowledge about photosynthesis and plant metabolism should be obtained.
4. Control of plant growth, development and transport of water and hormone should be understood.

The aim of this course is to help students acquire the DP1 and DP2 related knowledge, technique and performance. Students will carry out fieldwork for identification of leaf development and photomorphogenesis, and they are required to report about it.

2. Course Objectives

At the end of the course, participants are expected to

- (1) Explain the major characteristics and function of plants in comparison with those of animals and microorganisms.
- (2) Construct the academic basis of plant science that should be applied sciences such as agriculture, forestry, pharmacy, and environmental biology.
- (3) Relate the basic knowledge obtained in the lecture and outdoor observation in the field work.

3. Grading Policy

Your final grade will be calculated according to the following process: Reports and short-term exam on LMS (50%) and term-end examination (50%). In each class, a test will be conducted to review the lecture on LMS.

4. Textbook and Reference

Textbook

Shioi, Inoue, Kondo Eds. (2009) Basic master Plant Physiology (in Japanese)

Ohme, ISBN978-4-274-20663-4

5. Requirements(Assignments)

- Handouts should be hold in a letter file, and bring them every classes. Clear folder is not recommended.
- You are welcome to come and ask questions.

6. Note

7. Schedule

- [1] Overview of Plant Physiology: Why study plants? What kind of social situations does plant physiology help?
- [2] Life cycle of plants (1) Development and differentiation of plants from a point of view of common characteristics with animals, and their genetic regulations
- [3] Life cycle of plants (2): Development and differentiation of plants; leaf development, root development, and differentiation of pavement cells
- [4] Life cycle of plants (3): Light dependent plant growth and photomorphogenesis by phytochromes
- [5] Life cycle of plants (4): Light dependent plant growth and photomorphogenesis by cryptochromes, and light responses by phototropins
- [6] Life cycle of plants (5): Why many leaves turn red or yellow in autumn? Physiological background of leaf senescence
- [7] Life cycle of plants (6): Control of plant hormones
- [8] Life cycle of plants (7): Characteristics of plant structure, cell division, and mechanisms of transport of water and solute
- [9] Life cycle of plants (8): Reproduction of plants; various modes of reproduction in plants, genetic control of induction of flowering
- [10] Life cycle of plants (9) photoinduction of flowering, vernalization
- [11] Metabolism and energy capture (1): Metabolic pathway of cell respiration of plant
- [12] Metabolism and energy capture (2): Photochemical system of photosynthesis
- [13] Metabolism and energy capture (3): Variety of photosynthetic systems
- [14] Metabolism and energy capture (4): Metabolism of sugar and lipid
- [15] Metabolism and energy capture (5): Synthesis and function of secondary metabolites