

Syllabus

1. Course Title, style, and credit

Functional neural circuits

Lecture

1 credit

2. Appropriate grade level and Eligible Departments

All Departments

For Department of Physiological Sciences, D1, 2 (obligatory), D3-5 (optional)

3. Lectures

Yumiko Yoshimura

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8th Floor East, 2nd Building, NIPS (Yamate Area)

4. Time

[Oral]

15:00~17:00 on Fridays except January 18

(15:15~17:00 on January 14 and 21)

January 14, 18, 21

February 4, 18, 25

March 4, 11

5. Place

Seminar room, 2nd Floor West, 2nd Building, NIPS (Yamate Area)

The lectures will be delivered by the remote lecture system.

6. Prerequisites and Styles

Basic knowledge on the central nervous system will help to understand the lecture but is not essential.

7. Contents

Information processing in the central nervous system (CNS) is based on neural circuits consisting of various types of neurons. In this lecture, we will introduce the properties of basic circuits commonly found in various brain regions and specialized circuits found in particular regions, and also discuss how these properties contribute to the emergence of function in the circuits, and how the circuits are refined in an activity-dependent manner during development.

8. Course objectives

1. To understand the anatomical architecture and functional properties of the CNS
2. To understand the relationship between neural circuit properties and brain function
3. To understand activity-dependent refinement and development of neural circuits

9. Schedule

(1) January 14

Overview of the central nervous system

Yumiko Yoshimura (NIPS)

(2) January 18

Acquisition of auditory responsiveness and associated neural development in zebrafish brain

Yoichi Oda (Nagoya University)

(3) January 21

Spinal locomotor circuits in aquatic vertebrates

Shin-ichi Higashijima (NIPS)

(4) February 4

Early visual pathway

Takuma Mori (NIPS)

(5) February 18

Activity-dependent formation and reorganization of visual neural circuits

Yoshio Hata (Tottori University)

(6) February 25

Synaptic plasticity in hippocampus

Hiroki Yasuda (Gunma University)

(7) March 4

Cerebellar circuitry: development and plasticity

Kazuo Kitamura (Tokyo University)

(8) March 11

Microcircuitry of cortex

Yoshiyuki Kubota (NIPS)

10. Lecture materials and readings

“The Synaptic Organization of the Brain” edited by Gordon Shepherd, Oxford

11. Grades

Students are requested to file the short essay related to the Course Objectives. Either passed or failed is determined by the quality of the report. Students must attend the classes at least half of total classes to take a credit.

12. Notes

Nothing in particular