

## Syllabus

### 1. Course Title, style, and credit

Neural Mechanisms of Perception and Cognition

1 credit

### 2. Appropriate grade level and Eligible Departments

D1, 2 (obligatory), D3-5 (optional) School of Life Science

### 3. Lectures

Hidehiko Komatsu

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NIPS (Myodaiji) 6th Floor, Room 661

### 4. Time

[oral]

10:00~12:00 on

October 4, 11, 18, 25

November 1, 22, 29

December 6

### 5. Place

[oral] NIPS (Myodaiji) 1F, Lecture room

### 6. Prerequisites and Styles

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

### 7. Contents

Perception and cognition are important biological functions in which organisms obtain information about the surrounding environment. For this purpose, organisms utilize various kinds of physical events that are generated due to the presence of objects in the environment. Depending on the physical event utilized, information is processed by different sensory receptors or different sensory systems. This series of lectures mainly include topics on vision, but it also includes topics on tactile sensation.

Visual nervous system consists of the retina, lateral geniculate nucleus, and a number of visual areas in the cerebral cortex. Various kinds of visual information such as color, shape, motion and depth are extracted in these structures. In this lecture, you will learn the basic knowledge about the principles and basic properties of visual and tactile sensation. You will also learn the functional organization of the sensory nervous system, and how various sensory and perceptual informations are represented in the cerebral cortex.

#### 8. Course objectives

1. To understand the functional organization of the visual and somatosensory system
2. To understand the basic principle and manner in which sensory information is processed in the central nervous system
3. To understand how the neural activities in the cerebral cortex are related to perception and behavior

#### 9. Schedule

##### (1) 4<sup>th</sup> October

Introduction to the visual processing in the brain (language: English)

Hidehiko Komatsu (NIPS)

##### (2) 11<sup>th</sup> October

Functional architecture of the central visual system (language: English)

Hidehiko Komatsu (NIPS)

##### (3) 18<sup>th</sup> September

Decoding of sensory and perceptual information from neural activity  
(language: English)

Yoichi Miyawaki (The University of Electro-Communications)

##### (4) 25<sup>th</sup> October

Visual illusion: its mechanisms of perception and cognition (language: Japanese, with slides in English)

Akiyoshi Kitaoka (Ritsumeikan University)

##### (5) 1<sup>st</sup> November

Processing of shape information (language: English)

Isao Yokoi (NIPS)

##### (6) 22<sup>th</sup> November

Processing of color information (language: English)

Naokazu Goda (NIPS)

(7) 29<sup>th</sup> October

Processing of motion and depth information (language: English)

Takahisa Sanada (NIPS)

(8) 6<sup>th</sup> December

Mechanisms of human haptic processing (language: English)

Ryo Kitada (NIPS)

#### 1 0. Lecture materials and readings

Principles of Neural Science 4th edition, part V, Kandel ER, Schwartz JH, Jessel TM ed. McGraw-Hill 2000

#### 1 1. 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.

#### 1 2. Notes

Nothing in particular