Syllabus

1. Course title, style, and credit
Systems Neuroscience
(✓) Lecture ( ) Discussion ( ) Practice
1 credit

2. Appropriate grade level and eligible departments
(✓) D1, (✓) D2, (✓) D3, (✓) D4, (✓) D5
(✓) Department of Physiological Sciences, School of Life Science

3. Lecturers
Norihiro Sadato [sadato@nips.ac.jp, NIPS (Myodaiji)]
Masaki Isoda [isodam@nips.ac.jp, NIPS (Myodaiji)]
Atsushi Nambu [nambu@nips.ac.jp, NIPS (Myodaiji)]
Keiichi Kitajo [kkitajo@nips.ac.jp, NIPS (Myodaiji)]

4. Time
April 17, 24; May 15, 22, 29; June 5, 12, 19; 2020
AM 10:00-12:00

5. Place
Lecture room, NIPS Myodaiji Building 1F
Lectures will be delivered using a remote lecture system.

6. Prerequisites and styles
Each lecture begins with basic introduction, so that students can understand the content without specialized knowledge. Therefore, there is no lecture course that must be completed in advance. All lectures will be given in English.

7. Contents
This lecture course gives comprehensive explanations on and analytical methods of the structure and function of the central nervous system, with a primary focus on the cerebral cortex, basal ganglia, and cerebellum, in order to understand higher brain functions at the system level. In the 1st and 2nd lectures, we will introduce the latest findings on the neural substrates of social cognitive functions, which are mainly obtained from neuroimaging studies.

In the 3rd and 4th lectures, we will focus on the anatomical, physiological, and psychological bases/correlates of visual perception. In the 5th and 6th lectures, we will review cortico-basal ganglia-cerebellar mechanisms underlying the control of voluntary movements in physiology and disease. Finally, in the 7th and 8th lectures, we will explain cutting-edge approaches, such as mathematical modeling, information theory, complicated network analysis, and machine learning, to understand the operating principles of integrative brain function.

8. Course objectives:

(1) To understand the neural basis of social cognition.
(2) To understand the neural basis of visual perception.
(3) To understand the neural basis of motor control.
(4) To understand the detail and significance of cutting-edge methodologies to probe for the operating principles of the brain.

9. Schedule:

(1) April 17, 2020
"Social cognition (I)"
Norihiro Sadato (Div. Cerebral Integration)
(2) April 24, 2020
"Social cognition (II)"
Norihiro Sadato (Div. Cerebral Integration)
(3) May 15, 2020
"Anatomy, physiology and psychology of visual perception (I)"
Taihei Ninomiya (Div. Behavioral Development)
(4) May 22, 2020
"Anatomy, physiology and psychology of visual perception (II)"
Atsushi Noritake (Div. Behavioral Development)
(5) May 29, 2020
"Motor control by cerebral cortex, basal ganglia, and cerebellum: physiological conditions"
Atsushi Nambu (Div. System Neurophysiology)
(6) June 5, 2020
"Motor control by cerebral cortex, basal ganglia, and cerebellum: disease conditions"
Atsushi Nambu (Div. System Neurophysiology)
(7) June 12, 2020
"Neural basis of movement, cognition and their disorders from EEG and fMRI-network perspectives"

Kazumasa Uehara (Div. Neural Dynamics)

(8) June 19, 2020

"A computational neuroscience approach to clarifying the operational principles of brain information processing"

Keiichi Kitajo (Div. Neural Dynamics)

10. Lecture materials and suggested readings

None.

11. Grades

The following three conditions must be met to get credit:

(1) Students attend at least half of the lectures.

(2) Students choose one of the lectures and write an essay report summarizing the lecture content with 750-1500 English words.

(3) Students submit the essay report by the deadline specified later.

The grade is determined on the basis of the quality of the submitted report, which is indicated by A (corresponding to score 80-100), B (70-79), C (60-69), or D (less than 60); A, B or C is 'passed.'

12. Other notes

None.