

## Syllabus

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

Neuroscience of Cognition and Motor control

1 credit

### 2. Appropriate grade level and Eligible Departments

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

### 3. Lectures

Tadashi Isa

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NIPS (Myodaiji) 6th Floor, Room 662

### 4. Time

[oral]

10:00~12:00 on

April 12, 26

May 10, 17, 24, 31

June 14, 28

### 5. Place

[oral] Myodaiji Area : Main Conference room of the Staff Hall, 2nd Floor

### 6. Pre-requisites and Styles

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

### 7. Contents

We live our life by acting on the environment, getting food, and interacting with others through moving our body. It is critical requisite for us to move properly and adapt ourselves to the environmental change. Our cognitive function is reflected in our movements. Therefore, we can know other person's cognitive state by observing his or her movements. Thus, our motor ability is very important and its impairment by neuronal damage is threatening to our survival. However, if the damage is partial, we

can expect at least partial recovery through appropriate rehabilitative training. How to cure and compensate for the impaired function is a serious issue for the modern society and it can be a great contribution that neuroscience can make to the society. To develop effective therapeutic strategy and prosthetics for treatment of impaired neural functions, it is essential for us to understand the neural mechanism of motor control. This lecture series aims at acquiring fundamental knowledge on the motor control and at the same time to understand the cutting edge research in this field.

#### 8. Course objectives

- (1) Understanding the hierarchy of structure and function of the central nervous system (CNS), particularly the motor systems.
- (2) Understanding the discipline of researches investigating the relationship between cognition and movement
- (3) Understanding the cutting edge researches on the neuronal mechanism of functional recovery after the CNS injury and development of neuroprosthetics.

#### 9. Schedule

- (1) April 12 (Fri), Introduction I (Hierarchy of the motor system), Tadashi Isa (NIPS)
- (2) April 26 (Fri), Spinal cord, reflex and pattern generation, Kazuhiko Seki (National Institute of Neurology and Psychiatry)
- (3) May 10 (Fri), Motor learning and adaptation, Shigeru Kitazawa (Osaka University)
- (4) May 17 (Fri), Functional recovery after spinal cord injury, Yukio Nishimura (NIPS)
- (5) May 24 (Fri), Attention and movements, Masatoshi Yoshida (NIPS)
- (6) May 31 (Fri), Brain-machine interfaces, Yukio Nishimura (NIPS)
- (7) June 14 (Fri) Neuronal mechanism of “blindsight”, Masatoshi Yoshida (NIPS)
- (8) June 28 (Fri) Introduction II (Movement of eyes and hand), Tadashi Isa (NIPS)

#### 10. Lecture materials and readings

Principles of Neural Sciences, Fifth edition (eds) Eric R. Kandel, James H. Schwartz, Thomas M. Jessell, Steven A. Siegelbaum and A.J. Hudspeth, McGraw Hill

#### 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.

## 12. Notes

Nothing in particular