

## Course Description

### Introduction to Neuroscience

#### Aim of the course

##### **Aim of the course:**

The main objective of the course is to give an overview on the basic methods, shared disciplinary concepts and current theoretical models of Neuroscience, as a timely and developing multidisciplinary approach in understanding our brain.

##### **Learning outcome, competences**

knowledge:

- Psychophysiological, Neuroscience and Neuroanatomy concepts
- Current methods and main objectives in Neuroscience
- Basics in Neuroanatomy

attitude:

- Utilisation of knowledge in scientific communication, presentation

skills:

- Skills of applying main methods
- Skills of identifying related neurological and neuroanatomical structures of psychological functions

#### Content of the course

##### **Topics of the course**

**In modular structure, covering the following fields of research**

##### **Psychophysiology**

**Dr. Molnár Márk,**

**5x3 hours**

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|--|----------|
| • Methods in neuroscience                        | 6 hours  |
| • Psychopharmacology                             | 3 hours  |
| • Wakefulness, sleeping and attention regulation | 2 hours  |
| • Affective processes, stress                    | 2 hours  |
| • Learning and memory                            | 2 hours  |
|  | 15 hours |

##### **The neuroscience of main psychological functions**

**Dr. Honbolygó Ferenc**

**3x1,5 hours**

- Perception
- Object perception
- Attention

##### **Affective Neuroscience**

**Dr. Cserjési Renáta**

**3x 1,5 hours**

Physiological needs and brain regulation

- Psychology and physiology of Pain
- Neuronal basis of social perception and empathy

### **Introduction to Neurology and Neuroanatomy**

**Dr. Jakab György**

**3x3 hours or 6x1,5 hours**

### **Idegtudományi módszerek és a tudatosság**

**Dr. Nádasy Zoltán**

**2x3 óra**

- Neural coding 1x1,5
- Consciousness 1x1,5
- Computational methods in neuroscience 1x3

### **Learning activities, learning methods**

Lectures and interactive discussions

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| <b>Evaluation of outcomes</b> |
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#### **Learning requirements, mode of evaluation, criteria of evaluation:**

requirements

- Reliable basic knowledge in the domain of neuroscience and neuroanatomy

mode of evaluation: written exam

criteria of evaluation:

- Knowledge on basic concepts and the skill of utilizing the models of neuroscience adequately

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| <b>Reading list</b> |
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#### **Psychophysiology:**

##### **Mandatory readings:**

- Neil R. Carlson: Foundations of Physiological Psychology, *Allyn and Bacon, 1999*
- John T. Cacioppo: Handbook of Psychophysiology, *Cambridge Univ Press, 2007*
- Jerry W. Rudy: The Neurobiology of Learning and Memory, *Sinauer Associates, Inc. Publishers, 2008*
- Kenneth Hugdahl: Psychophysiology, *Harvard Univ. Press, 2001*

#### **Consciousness:**

Mandatory Reading list:

- Koch C, Massimini M, Boly M, Tononi G. (2016) Neural correlates of consciousness: progress and problems. *Nat Rev Neurosci.* 17(5):307-21. doi: 10.1038/nrn.2016.22.

Recommended:

- Cohen MA, Dennett DC (2011) Consciousness cannot be separated from function. *Trends Cogn Sci.* 15(8):358-64. doi: 10.1016/j.tics.2011.06.008.

#### **Neural coding:**

Mandatory Reading list:

- John von Neumann Neumann The Computer and the Brain (The Silliman Memorial

Lectures Series)

Recommended:

- Engel AK, Singer W. (2001) Temporal binding and the neural correlates of sensory awareness, Trends Cogn Sci. 5(1):16-25. PMID: 11164732

### **Computational methods in neuroscience**

Mandatory Reading list:

Stiefel KM, Ermentrout GB. (2016) NEURONS AS OSCILLATORS. J Neurophysiol. jn.00525.2015. doi: 10.1152/jn.00525.2015.

Recommended:

- Peter Dayan: Theoretical neuroscience (Computational and Mathematical Modeling of Neural Systems)
- Rieke F Warland D, van Steveninck R, Bialek W: Spikes: Exploring the Neural Code (Computational Neuroscience)