

Doctoral School: **Biology Doctoral School**  
Doctoral Program: Neuroscience and Human Biology

Subject code: **BIO/7/7**  
Subject title: **Biological rhythms L**  
Teacher and Neptun code: **Dr. D t ri L szl  (D7ZI0N)**  
Credits: 4  
Class hours: 2 hours/week, lecture

#### Aims of the course

The lecture provides an overview of the neural background mechanisms of biological rhythms, with particular emphasis on the sleep-wake cycle.

#### Contents of the course

1. Introduction. Description of the subject. Basic concepts related to biological rhythms.
2. Daily rhythms I. Features of daily rhythms. The effect of temperature and light on rhythms.
3. Daily rhythms II. Human daily rhythms. A critique of the so-called theory of "biorhythms".
4. The biological clock I. The mammalian master clock is the suprachiasmatic nucleus. Anatomy of the nucleus. The role of the pineal gland.
5. The biological clock II. Rhythm generation of the SCN. Inputs and outputs of the nucleus.
6. Operation of the biological clock. Lessons from models describing its operation.
7. Genetic background of the biological clock. Discovery of clock genes. Explanation of the clock's operation on the cellular level.
8. The phenomenology of sleep. Stages of sleep. Physiological variables during sleep. EEG patterns in the sleep-wake cycle.
9. Neural regulation of sleep I. Sleep centers and waking structures. Historical Overview.
10. Neural regulation of sleep II. Current ideas about the neural mechanisms of sleep.
11. The basal forebrain cholinergic system. The basal forebrain plays a prominent role in the regulation of sleep and wakefulness.
12. Homeostatic regulation of sleep. Sleep factors. Sleep deprivation. The "two process" theory.
13. REM sleep. Regulatory structures of REM sleep. Theories on the function of REM sleep.
14. Sleep Disorders. Insomnia, parasomnia, abnormal drowsiness.

#### Requirements

Written exam

Grade is determined by the exam result.

#### Literature

Power point slides, circa 200 slides

