



**Study program:** Doctoral Academic Studies in Biomedical Sciences

**Name of the subject:** COGNITIVE AND BEHAVIORAL NEUROSCIENCE

**Teacher(s):** Vojislava V. Bugarski Ignjatović, Marija D. Semnic, Željko D. Živanović, Jelena V. Ostojić, Aleksandra S. Dickov, Svetlana M. Ivanović Kovačević

**Status of the subject:** elective

**Number of ECTS points:** 20

**Condition:** -

**Goal of the subject**

The goal of the course is aimed at acquiring knowledge from the interdisciplinary field that deals with the research of the relationship between the biological basis, on the one hand, and cognitive processes and human behavior, on the other hand. The application of neuroradiological, neurophysiological, neurocognitive and neurobehavioral methods is of special importance in the examination of a given relationship. Students will have the opportunity to master knowledge related to a wide range of topics ranging from the history of cognitive neuroscience, the neurobiological basis of cognitive processes, genetic and developmental mechanisms underlying human behavior, through detailed analysis of various cognitive processes such as consciousness, perception, attention, memory, learning, thinking, decision making, executive functions and language. Students will gain knowledge about the neuropsychological foundations of emotions and social cognition, as well as the importance of the phenomenon of plasticity, especially in various neurological syndromes.

**Outcome of the subject**

Students will master the basic knowledge in the field of cognitive and behavioral neuroscience that are necessary for independent research work. Students will be introduced to the latest scientific theoretical and practical knowledge needed to successfully define and examine the relationships between biological foundations, perception, basic behaviors and cognitive functions with the help of modern neuroradiological, neurophysiological and neurocognitive methods and techniques. By acquiring the given knowledge, students will be able to independently create research problems, set goals and conduct research in the field of cognitive neuroscience.

**Content of the subject**

*Theoretical lectures*

1. Introduction to cognitive neuroscience - a historical perspective
2. Developmental cognitive neuroscience – nature versus nurture
3. Neurobiology of cognition
4. Physiological, genetic and developmental mechanisms of behavior
5. Consciousness, perception and attention (working memory)
6. Learning and memory
7. Reasoning, problem solving, language
8. Decision making, executive control and performance of activities
9. Social cognition
10. Emotions - neuropsychological view
11. In vivo human brain imaging methods (CT, MRI)
12. Recording of psychophysiological activity in humans (EEG, Cognitive evoked potentials)
13. Structural brain imaging in neuropsychology (conventional MRI, volumetry)
14. Functional brain imaging in neuropsychological research (MR spectroscopy, fMRI, DTI)
15. Neurocognitive and neurobehavioral assessment
16. The phenomenon of brain plasticity in neurological syndromes

*Practical lectures*

1. Differences between philosophical and scientific approach to the relationship of thought, feeling, emotion and brain
2. Examining the influence of genetic and environmental factors on the developing brain
3. Neurobiological bases of sight, hearing and language
4. Genetic and molecular basis of cognition - behavioral genetics
5. Study, examination and measurement of cognitive status - from awareness to decision making
6. Social perception - understanding the mental state of others
7. Emotions, affective styles and motivation - neuropsychological basis

8. Importance of human brain imaging in vivo in neuropsychological research
9. Application of various tests to examine cognitive functions
10. Brain plasticity as a protective factor in neurological syndromes

**Recommended literature**

*Obligatory*

1. Baars BJ, Gage NM. Cognition, brain, and consciousness: Introduction to cognitive neuroscience. Academic Press; 2010.
2. Ward J. The student's guide to cognitive neuroscience. Psychology Press; 2015.
3. Johnson MH, de Haan M. Developmental cognitive neuroscience .Wiley Blackwell; 2015.
4. Pinel JP. Biopsychology. Pearson education; 2009.
5. Suchy Y. Clinical neuropsychology of emotion. Guilford Press; 2011.

*Additional*

The student will be presented adequate literature with each methodical unit of theoretical teaching

**Number of active classes**

**Theory: 60**

**Practice: 45**

**Methods of delivering lectures:** lectures, workshops, presentations, seminar papers.

**Evaluation of knowledge (maximum number of points 100)**

activity during lectures: 15

practical exercises: 20

essays: 15

written exam: 50