



## ЦЕНТЪР ЗА ОБУЧЕНИЕ – БАН

1000 София  
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### **Basic Information:**

Course Title: Physiological basis of memory and learning

Lecturer: Assoc Prof. Daniela Pechlivanova, PhD

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Total Teaching Hours: 30 hours of lectures

### **Annotation** (up to 150 words)

The optional elective course “Physiological basis of memory and learning” provides PhD students who are interested in clarifying the mechanisms of memory and learning with the opportunity to extend their knowledge and acquire methodological approaches in search of answers to the questions in this area. The course provides a contemporary physiological basis of human memory and learning. The memory structures and processes are viewed in the light of neurobiology. The lectures considered some essential theoretical and preclinical models of processes related to memory and learning. They view the key preclinical models to study the different types of memory and learning and methods of assessing the impact of age, gender, and alimentary factors on them. Within the framework of the course, there are planned opportunities for students to prepare individual projects on the main topics of that will be presented and discussed during the lectures.

### **Course content** (brief description by topics or modules)

Topic / Module 1: Basic concepts: types of memory, mechanisms of learning. Functional organization of the brain structures involved in memory processes and learning.

Topic / Module 2: A three-step model of memory. Sensory memory - the length and types. Modalities - individual characteristics.

Topic / Module 3: Short-term memory. Long-term potentiation and long-term depression - mediators and gene mechanisms.

Topic / Module 4: Experimental models of short-term memory.

Topic / Module 5: Working memory - significance and age dependency. Methods for exercise to improve working memory.

Topic / Module 6: Motivation and attention. Habituation and sensitization. ADHD, attention deficit - experimental models.

Topic / Module 7: Long-term memory. Memory consolidation - mechanisms. Theories of forgetting - attenuation, interference, and transformation.

Topic / Module 8: Episodic and semantic memory. Significance of gender. Autobiographical memory.

Topic / Module 9: Declarative (explicit) and procedural (implicit) memory. Role of emotions and physical activity.

Topic / Module 10: Age-dependent changes in memory processes. Amnesia types - retrograde, anterograde, post-traumatic, psychogenic.

Topic / Module 11: Learning - associative and non-associative, classical and operant conditioning. Experimental methods for the study of long-term memory.

Topic / Module 12: Lateralization of brain function. Role in the formation of spatial memory.

Topic / Module 13: Nootropic drugs.



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Topic / Module 14: Impact of food and food supplements on memory and learning.

Topic / Module 15: Impact of the abuse of amnesic and psychotropic drugs on cognitive processes.

### Teaching and assessment methods

Presentation of a chosen topic.

Oral exam.

### Competencies acquired as a result of training (3–5 points)

- Knowledge of the structure of the brain and its functional connections;
- Detailed knowledge of the different types of memory;
- Molecular, cellular, structural, and systemic mechanisms of short-term and long-term memory, motivation, and attention;
- Types of learning;
- Basic methods in the study of memory and motivation.

### Literature:

Vander's Human Physiology The Mechanisms of Body Function. Authors: Eric Widmaier, Hershel Raff, Kevin Strang; Publisher: WCB/McGraw-Hill, 13th Edition 2014;

Ganong's Review of Medical Physiology. Authors: Kim E. Barrett, Susan M. Barman, Scott Boitano. Publisher: McGraw-Hill Medical; 25th Edition, 2015.

McDonald M. Your brain. The missing manual. Pogue Press, 2008

[www.human-memory.net](http://www.human-memory.net)

<https://pubmed.ncbi.nlm.nih.gov/>

**Additional information** (optional) (e.g., special requirements, laboratory equipment, prior knowledge)

Acquired knowledge of anatomy, chemistry, biochemistry, biophysics, general biology and morphology.