SYLLABUS

Neurophysiology

University year 2025/2026

1. Information regarding the programme

1.1. Higher education institution	**"Babeş-Bolyai" University Cluj-Napoca**
1.2. Faculty	**Faculty of Biology and Geology**
1.3. Department	**Biology and Ecology Department of Hungarian Line**
1.4. Field of study	**Biology**
1.5. Study cycle	**2 years**
1.6. Study programme/Qualification	**Medical Biology/Master of Medical Biology**
1.7. Form of education	**with frequency**

2. Information regarding the discipline

2.1. Name of the discipline	**Neurophysiology**					Discipline code	
2.2. Course coordinator				**dr. Magor Lőrincz, Associate Professor**			
2.3. Seminar coordinator				**dr. Magor Lőrincz, Associate Professor**			
2.4. Year of study	II	2.5. Semester	1	2.6. Type of evaluation	E	2.7. Discipline regime	Ob.

3. Total estimated time (hours/semester of didactic activities)

3.1. Hours per week	**4**	of which: 3.2 course	**2**	3.3 seminar/laboratory	**2**
3.4. Total hours in the curriculum	154	of which: 3.5 course	28	3.6 seminar/laborator	**28**
Time allotment for individual study (ID) and self-study activities (SA)					**hours**
Learning using manual, course support, bibliography, course notes (SA)					42
Additional documentation (in libraries, on electronic platforms, field documentation)					30
Preparation for seminars/labs, homework, papers, portfolios and essays					22
Tutorship					0
Evaluations					4
Other activities:					-
3.7. Total individual study hours	**98**				
3.8. Total hours per semester	**154**				
3.9. Number of ECTS credits	**6**				

4. Prerequisites (if necessary)

4.1. curriculum	
4.2. competencies	

5. Conditions (if necessary)

5.1. for the course	Course room with laptop, with video projector and with necessary software (Power Point, Word), multimedia appliances, Internet
5.2. for the seminar /lab activities	Laboratory room - mounted properly: laboratory apparatus and materials (centrifuges, thermostat, electrophoretic apparatus, spectrophotometer, thermocycler). The laboratory equipment and material are ensured for use by the Faculty of Biology and Geology.

6.1. Specific competencies acquired [1]

[1] One can choose either competences or learning outcomes, or both. If only one option is chosen, the row related to the other option will be deleted, and the kept one will be numbered 6.

Professional/essential competencies	• Cognition, understanding and acquirement of the advanced concepts, theories and methods of biology as well as the adequate use of them in professional communication. • Acquiring basic concepts of neuronal function
Transversal competencies	• Ability of working in groups of life sciences researchers, ability of resolving problems and making decisions, organization of activities in a group.

6.2. Learning outcomes

Knowledge	The student knows the basic principles of neuronal function, including membrane potentials, action potentials, and synaptic transmission. The student knows the key cellular and molecular mechanisms underlying neuronal communication and signal processing. The student knows the advanced theories and models related to neurophysiological processes, including neuroplasticity, synaptic plasticity, and the role of neurotransmitters in neuronal activity.
Skills	The student is able t describe and explain the basic mechanisms of neuronal function, including generation and propagation of action potentials and synaptic transmission. The student is able to apply advanced neurophysiological concepts and theories to analyze and solve prol related to brain function and behavior. The student is able to use appropriate scientific methods and techniques, such as electrophysiological recordings or computational models, to investigate neuronal processes. The student is able to critically evaluate and interpret experimental data and research findings in neurophysiology.
Responsibility and autonomy:	The student has the ability to work independently to obtain and critically analyze scientific literature and data related to neurophysiology. The student has the ability to work independently to obtain insights into complex neurophysiological phenomena, integrating theoretical knowledge with experimental evidence. The student has the ability to work independently to obtain and apply advanced methodologies and techniques for studying neuronal function and brain systems.

7. Objectives of the discipline (outcome of the acquired competencies)

7.1 General objective of the discipline	• Throughout the course the students will become familiar with basic concepts of neuronal functio
7.2 Specific objective of the discipline	• Acquiring basic concepts of neuronal function

8. Content

8.1 Course	Teaching methods	Remarks

Introduction: Basic structure of the nervous system.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
Methods in neuroscience.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
The resting membrane potential.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
The action potential.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 1: the neuromuscular junction.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 2: excitatory and inhibitory synapses.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 3: presynaptic elements	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 4: postsynaptic elements	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 5: synaptic plasticity.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
Synaptic neurotransmission 6: neuronal networks.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Neuromodulation.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Cortical functions 1.	Interactiveexposure Conversation Explanation Didacticaldemonstration	2 hours
Cortical functions 2.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
The thalamocortical system.	Interactive exposure Conversation Explanation Didacticaldemonstration	2 hours
Bibliography:Larry R. Squire , Darwin Berg: Fundamental Neuroscience, Third Edition, Academic Press, 2008		
8.2 Seminar / laboratory	Teaching methods	Remarks
Introduction: Basic structure of the nervous system.	Interactive exposure. Conversation.	2 hours

Methods in neuroscience.	Interactive exposure Explanation Conversation. Experimental Demonstration.	2 hours
The resting membrane potential.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
The action potential.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
Synaptic neurotransmission 1: th neuromuscular junction.	Interactive exposure Explanation Conversation. Experimental Demonstration.	2 hours
Synaptic neurotransmission 2: excitatory and inhibitory synapses.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
Synaptic neurotransmission 3: presynaptic elements	Interactive exposure Explanation Conversation. Experimental Demonstration.	2 hours
Synaptic neurotransmission 4: postsynaptic elements.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
Synaptic neurotransmission 5: synaptic plasticity.	Interactive exposure. Explanation Conversation. Experimenta Demonstration.	2 hours
Synaptic neurotransmission 6: neuronal networks.	Interactive exposure Explanation Conversation. Experimental Demonstration.	2 hours
Neuromodulation.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
Cortical functions 1.	Interactive exposure. Explanation Conversation. Experimental Demonstration.	2 hours
Cortical functions 2.	Interactive exposure Explanation Conversation. Experimental Demonstration.	2 hours
The thalamocortical systen		2 hours
Bibliography:Constance Hammond: Cellular and Molecular Neurophysiology, Third Edition, Third Edition, Academic Press, 2008		

9. Corroborating the content of the discipline with the expectations of the epistemic community, professional associations and representative employers within the field of the program

- The content of the discipline is in accordance with the contents tought in other romanian universities and in foreign countries.

10. Evaluation

Activity type	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 Percentage of final grade
10.4 Course	Verification of the theoretical knowledge	Oral test at the end of the semester	80%
	Verification of the theoretical knowledge	Test during semester	10%
10.5 Seminar/laboratory	Verification of the practical knowledge	Oral test at the end of the semester	10%
10.6 Minimum standard of performance			
Cognition of the basic concepts and principles, the minimal note is 5.			

11. Labels ODD (Sustainable Development Goals)[2]

	General label for Sustainable Development							
								

Date:
2024/11/11

Signature of course coordinator

Dr. Magor L. Lőrincz

Signature of seminar coordinator

Dr. Magor L. Lőrincz

Date of approval :
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Signature of the head of department

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[2] Keep only the labels that, according to the *Procedure for applying ODD labels in the academic process*, suit the discipline and delete the others, including the general one for *Sustainable Development* – if not applicable. If no label describes the discipline, delete them all and write „ *Not applicable*.".