

## COURSE UNIT (MODULE) DESCRIPTION

Course unit (module) title	Code
Molecular mechanisms of signal transduction	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Gytis Svirskis  Other(s):	Life Sciences Center, Institute of Biosciences

Study cycle	Type of the course unit (module)
Second	Compulsory

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Face-to-face and distance learning	3 <sup>rd</sup> semester	English

Requirements for students	
<b>Prerequisites:</b> Neurophysiology, Biophysics of sensory systems, Biotransport, Neurochemistry	<b>Additional requirements (if any):</b>

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
5	133	64	69

Purpose of the course unit (module): programme competences to be developed
To develop: ability to work in group with colleagues from a variety of backgrounds and to take the initiative; ability to learn and to teach, to increase knowledge, to search for new or missing information in various databases; ability to apply the knowledge and understanding in practice; ability to understand the structure and functions of the nervous system at various levels of organization; ability to understand and explain the principles of the ways organism receive and process external and internal information; ability to design experiments, to analyze, critically evaluate data and to present research findings both in writing and orally.

Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
Will understand the advantages of the group work.	Project preparation	Presentation
Will be able to perform a task effectively while working in group i.e. to collect, systematize and present information.	Project preparation	Presentation
Will be able critically and adequately evaluate impact of each member in jointly performed task.	Project preparation	Presentation
Will know where and how to find necessary information by means of modern technology	Finding and reading of review and scientific papers, seminar preparation, project preparation	Presentation
Will be able to analyze and systemize information	Reading of review and scientific papers, seminar preparation, project preparation	Presentation
Will be able to present collected information in a systemic, clear way	Reading of review and scientific papers, seminar preparation, project preparation	Presentation
Will be able learn and improve further, to maximally apply gained knowledge and skills	Reading of review and scientific papers, seminar preparation, project preparation	Presentation

Will understand the structure and functions of the nervous system at the molecular and cellular level	Lectures, reading of review and scientific papers, seminar preparation, project preparation	Colloquium, examination, presentation
Will be able to integrate topics in cellular, molecular, sensory, motor and cognitive neurobiology.	Lectures, reading of review and scientific papers, seminar preparation, project preparation	Colloquium, examination, presentation
Will be able to understand basic cellular and molecular mechanisms of neuropathologies.	Lectures, reading of review and scientific papers, seminar preparation, project preparation	Colloquium, examination, presentation
Will have the knowledge and be able to explain the way organisms sense and percept the external environment	Lectures, reading of review and scientific papers, seminar preparation, project preparation	Colloquium, examination, presentation
Will understand the way organisms control their internal environment and respond to external changes.	Lectures, reading of review and scientific papers, seminar preparation, project preparation	Colloquium, examination, presentation
Will be able to develop cogent and critical discussion based on the experimental data and study program material.	Seminar attendance, project presentation attendance	Activity during seminar and project presentation

Content: breakdown of the topics	Contact hours							Self-study work: time and assignments	
	Lectures	Tutorials	Seminars	Exercises	Laboratory work	Internship/work placement	Contact hours	Self-study hours	Assignments
1. Ion diffusion	2		2				4	4	Seminar preparation
2. Principles of channel mechanisms	2		2				4	4	Seminar preparation
3. Diversity and structure of potential gated ion channels	2		2				4	4	Seminar preparation
4. Molecular mechanisms of neurotransmitter release, function of neuroglia	2		2				4	4	Seminar preparation
5. Postsynaptic ligand gated receptors	2		2				4	4	Seminar preparation
6. Structure and function of G protein binding receptors	2		2				4	4	Seminar preparation
7. Molecular mechanisms of sensory transduction	2		2				4	4	Seminar preparation
8. Molecular mechanisms of motor transduction	2		2				4	4	Seminar preparation
9. Colloquium	2						2	6	
10. Diversity of brain modulatory systems	2		2				4	4	Seminar preparation
11. Axon growth and guidance	2		2				4	4	Seminar preparation
12. Neurotrophic factors	2		2				4	4	Seminar preparation
13. Synaptic plasticity	2		2				6	4	Seminar preparation
14. Mechanisms of epilepsy	2		2				4	5	Project preparation
15. Mechanisms of mood disorders	2		2				4	5	Project preparation
16. Mechanisms of neurodegenerative diseases	2		2				4	5	Project preparation
<b>Total</b>	<b>33</b>		<b>31</b>				<b>64</b>	<b>69</b>	

Assessment strategy	Weight, %	Deadline	Assessment criteria
Content of seminar presentation and activity during presentation	16.6	During semester	Assessment of duration of presentation, number of illustrations, clarity of presentation, answering of questions.
Content of project presentation and activity	16.6	During semester	Assessment of interaction between students preparing the project, division of project material between students, discussion of possible mechanisms of neuropathologies,

during presentation			duration of presentation, number of illustrations, clarity of presentation, answering of questions.
Colloquium	33.3	Mid-semester	Assessment of understanding, and number of questions answered in the selection of questions from various themes.
Examination	33.3	January	Assessment of understanding, and number of questions answered in the selection of questions from various themes.

<b>Author</b>	<b>Year of publication</b>	<b>Title</b>	<b>Issue of a periodical or volume of a publication</b>	<b>Publishing place and house or web link</b>
<b>Compulsary reading</b>				
L.R. Squire	2012	Fundamental Neuroscience		Academic Press
G.J. Siegel	2012	Basic Neurochemistry		Philadelphia: Lippincott, Williams & Wilkins
G. Svirskis	2007	Neurotransdukcija		Vilniaus universitetas
<b>Optional reading</b>				
E. Kevelaitis, M. Illert, H. Hultborn	2007	Žmogaus fiziologija		Kauno medicinos universiteto leidykla
B. Hille	2001	Ion channels of excitable membranes		Sinauer Associates Inc.