Course unit (module) title	Code
Neurobiology	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: prof. Algirdas Utkus **Other(s):** Prof. Osvaldas Rukšėnas (43 hours), Dr. Robertas Guzulaitis (20 hours), Prof. Valentina Vengelienė (6 hours)	Dept. Neurobiology and Biophysics, Life Sciences Center Dept. Human and Medical Genetics, Faculty of Medicine

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

Mode of delivery	Period when the course unit (module) is delivered	Language(s) of instruction
Self-study Lectures, seminars and practice	Autumn, semester 3	English

Requirements for students	
Prerequisites: Genomics, Cell Biology, Genome structure, Epigenomics, Transcriptomics	**Additional requirements (if any):**

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
10	260	129	131

Purpose of the course unit (module): programme competences to be developed
In this course integrating Neurobiology and Neurogenetic students will acquire knowledge on principles and mechanisms of nervous and sensory systems, and foundations of neurogenetics in a human organism, mechanisms of inherited neurological disturbances; develop the abilities to apply knowledge of neurogenetics to the analysis of the normal and pathological characteristics of a human organism.

Learning outcomes of the course unit (module)	Teaching and learning methods	Assessment methods
3.1 Be able to apply modern research methods in neurobiology and neurogenetics in system biology	Lectures	Two Test; Defence of scientific project
4.1 Perform practical and theoretical work in system biology in accordance with the bioethics requirements	Lectures, research project	Two Test; Defence of scientific project
4.2 Have summarizing skills enabling them to communicate in a clear manner with specialists from other fields or the public about professional project, on work results, or about the results of tasks	Research project	Two Test; Defence of scientific project
5.1 Be able to work autonomously and as a part of a multidisciplinary team; act honestly and according to ethical obligations	Research project	Two Test; Defence of scientific project
5.2 Be able to critically analyse their own professional practices with a view to improving them	Lectures, research project	Two Test; Defence of scientific project

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
Neurobiology									
1. Neuron – structural/functional unit of CNS Dr. R. Guzulaitis 2 hours, Prof. O. Rukšėnas 3	2			3			**5**	**5**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 71-87
2. Electrical potentials in CNS Dr. R. Guzulaitis 2 hours, Prof. O. Rukšėnas 3	2			3			**5**	**5**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 127-135, 149-156
3. Synapses Prof. V. Vengelienė 2 hours, Prof. O. Rukšėnas 3	2			3			**5**	**5**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 177-186, 260-275, 290-297
4. Brain structure and functions Prof. V. Vengelienė 4 hours, Prof. O. Rukšėnas 3	4			3			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 338-352, 357-363, 393-399
5. Spinal cord structure and functions Dr. R. Guzulaitis 4 hours, Prof. O. Rukšėnas 3	4			3			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 356-360
6. Somatic and autonomous nervous systems Prof. O. Rukšėnas 5 hours	2			3			**5**	**5**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 744-763,
7. Introduction to sensory systems Dr. R. Guzulaitis 4 hours, Prof. O. Rukšėnas 3	4			3			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 451-472
8. Visual system Dr. R. Guzulaitis 4 hours, Prof. O. Rukšėnas 3	4			**3**			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 556-573, 578-583, 592-599
9. Auditory/equilibrium system Prof. O. Rukšėnas 7 hours	4			**3**			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 655-676, 684-705, 917-929
10. Chemosensory system Prof. O. Rukšėnas 7 hours	4			**3**			**7**	**7**	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 712-733

11. Somatosensory system Dr. R. Guzulaitis 4 hours, Prof. O. Rukšėnas 3	4			3			7	8	Self-study, Kandel E. R., Schwartz J. H., Jessell M. T. 2012, P. 475-495
Total Neurobiology	36			33			69	70	
Neurogenetics									
1. Genetic advice and testing: basics of inheritance	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 11-23
2. Genetics of epilepsy	4		2				6	6	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 38-49
3. Genetics of dementia	4		2				6	6	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 24-37
4. Disorders of vision	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 49-74
5. Cerebellar and spinocerebellar disorders	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 75-91
6. Movement disorders	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 102-136
7. Cerebrovascular disease	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 137-149
8. Motor neuron diseases	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 150-174
9. Genetics of neuropathies	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 175-196
10. Muscle disease	2		2				4	4	Preparation for seminar (self-study). Recommended reading:

								Warner, Hammans 2009, 197-228
11. Muscle channelopathies and metabolic myopathies	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 229-244
12. Mitochondrial disease	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 245-259
13. Neurogenetics aspects of chromosomal aberration	2		2				4	4	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 310-320
14. Genetics of nervous system tumor predisposition	2		2				4	5	Preparation for seminar (self-study). Recommended reading: Warner, Hammans 2009, 260-275
Total Neurogenetics	32		28				60	61	
Total	68		28	33			129	131	

Assessment strategy	Weight,%	Deadline	Assessment criteria
Neurobiology	**50%**		
Two MCQ (Multiple choice questionnaire) type colloquiums Research project	70 30	During the course	Accumulative score. Each colloquium – 25 questions, each has 5 answers. For project presentations, all group members are given the same evaluation.
Neurogenetics	**50%**		
Control test (two quiz)	Total 20% (each 10%)	During the course	Evaluation method: written examination comprised of 3 theoretical open-ended questions; detailed answer, the consistency and accuracy of the presented information.
Final examination: a test at the end of the course	80%	January	Test consists of the 70 closed-ended questions; each question shall carry one mark, total marks being 70. Evaluation description: 10: Outstanding knowledge and skills. Evaluation level. 70-66 grades. 9: Good knowledge and skills with unessential mistakes. Synthesis level. 65-61 grades. 8: Average knowledge and skills with mistakes. Analysis level. 60-56 grades. 7-6: Below average knowledge and skills with substantial mistakes. Knowledge application level. Accordingly, 55-51 and 50-46 grades. 5: Knowledge and skills meet minimum criteria. Many mistakes. Level of knowledge and understanding. 45-41 grades. 4-0: Knowledge and skills do not meet minimum criteria. 40-0 grades.

Author	Year of publication	Title	Issue of a periodical or volume of a publication	Publishing place and house or web link
Compulsary reading				
Kandel E. R., Schwartz J. H., Jessell M. T. 1760 p.	2012	Principles of Neural science		McGraw-Hill Education / Medical; 5th edition
Warner T.T, Hammans S.R.	2009	Practical guide to neurogenetics		Saunders Elsevier
Optional reading				
Squire, Larry R.	2003	Fundamental Neuroscience	2nd ed.	San Diego, Calif: Academic
Scientific papers				

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