COURSE UNIT DESCRIPTION

Course unit title	Code
Neurology and Neurosurgery (2024-2025)	

Lecturer(s)	Department(s) where the course unit (module) is delivered
Coordinator: Prof. dr. D. Jatužis **Other(s):** Prof. dr. G. Kaubrys; Prof. dr. S. Ročka; Prof. dr. R. Mameniškienė; Prof. P. Smith; Assoc. prof. dr. K. Ryliškienė; Assoc. prof. dr. J. Valaikienė; Assoc. prof. dr. R. Kizlaitienė; Assoc. prof. dr. A.Vilionskis; Assoc. prof. dr. N. Giedraitienė; Assoc. prof. A. Jasionis; Assist. prof. dr. R. Kaladytė Lokominienė; Assist. prof. dr. A. Vaitkevičius; Assist. prof. dr. A. Klimašauskienė; Assist. prof. dr. R. Kvaščevičius; Assist. prof. dr. A. Preikšaitis; Assist. prof. dr. I. Slautaitė; Assits. prof. dr. R. Daukšys; Assist. prof. dr. G. Terbetas; Assist. prof. dr. Ž. Chomanskis; Assist. prof. dr. I. Sereikė; Assist. prof. dr. E. Audronytė; Assist. prof. dr. R. Masiliūnas; Assist. prof. dr. A. Ekkert; Junior assist. V. Taluntienė; Junior assist. J. Guk; Junior assist. A. Daškevičiūtė; Junior assist. V. Lukošaitis; Lecturer G. Lukšys; Lecturer A. Visockytė; Lecturer G. Sudarytė.	Vilnius University, Faculty of Medicine, Clinic of Neurology and Neurosurgery, Santariškių str. 2, Vilnius (Center of Neurology, Vilnius University Hospital Santaros klinikos, Santariškių str. 2, Vilnius; Center of Neuroangiosurgery, Republican Vilnius University Hospital, Šiltnamių str. 29, Vilnius; Center of Neurosurgery, Vilnius University Hospital Santaros klinikos, Santariškių str. 2, Vilnius)

Study cycle	Type of the course unit (module)
Integrated studies (cycle I and II)	Compulsory

Mode of delivery	Period when the course unit (nodule) is delivered	Language(s) of instruction
Face-to-face: lectures and seminars in the auditory room; practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.	Semester 7 and 8	English

Requirements for students	
Prerequisites: A student must have completed the following courses: human anatomy, human physiology, pharmacology, pathology, general medicine propedeutics and fundamentals of nursing.	**Additional requirements (if any):** None

Course (module) volume in credits	Total student's workload	Contact hours	Self-study hours
10 credits	266 hrs	132	134

Purpose of the course unit (module): programme competences to be developed		
Students must know the main symptoms and syndromes of impairment of central and peripheral nervous system. They must be able to recognise and assess the general and focal neurological clinical signs and symptoms, to evaluate the level of consciousness and mental state of the patient. They must know the indications of modern diagnostic methods in neurology (ultrasound of cerebral blood vessels, computer tomography (CT) and magnetic resonance imaging (MRI) of brain and spine, electroencephalography (EEG), electroneuromyography (ENMG), angiography). Students must know main principles and methods of prevention, diagnostics and treatment of neurological and neurosurgical diseases.		
Learning outcomes of the course unit (module)	**Teaching and learning methods**	**Assessment methods**
Generic competences At the end of the study programme student will be able:		
to act fairly and according to ethical obligations; be emphatic; to think critically and self-critically; to be creative and take the initiative; to reach personal targets; to communicate with others	Practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.	Continuous assessment of practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.
to make an assessment within the scope of one's competence and, if necessary, ask for help; to solve problems and make judgements; to communicate and work in one team with specialists of other fields and experts of other scientific areas	Practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.	Continuous assessment of practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.
Subject-specific competences At the end of the study programme student will be able:		
to take a history from the patient with neurological disease, evaluate the complaints, carry out physical examination; to make clinical judgements and decisions for further diagnostics and treatment options; to provide explanations and advise for the patients	The analysis of clinical cases during seminars and practical training at the departments of neurology and neurosurgery.	Continuous assessment of the analysis of clinical cases during seminars and practical training at the departments of neurology and neurosurgery. Written examination at the end of the study.
to recognise and assess the general and focal neurological clinical signs and symptoms, to evaluate the level of consciousness and mental state of the patient, to assess the signs of meningeal irritation; to recognise and assess critical health conditions, to treat critical health conditions, to provide first aid, to resuscitate and support main life functions according to current European standards	Lectures and practical training in the auditory rooms at the departments of neurology and neurosurgery.	Continuous assessment of acquirement of practical skills during practical training at the departments of neurology and neurosurgery. Written examination at the end of the study.
to know the indications of modern diagnostic methods in neurology (ultrasound of cerebral blood vessels, computer tomography (CT) and magnetic resonance imaging (MRI) of brain and spine, electroencephalography (EEG), electroneuromyography (ENMG), angiography).	Lectures and practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics.	Continuous assessment of practical training at the departments of neurology and neurosurgery, diagnostic labs. Written examination at the end of the study.

to know the main principles and methods of treatment of neurological disorders, medication and physiotherapy; to understand the main principles and measures of prevention of neurological diseases.	Lectures, seminars and practical training at the departments of neurology and neurosurgery.	Continuous assessment of practical training at the departments of neurology and neurosurgery. Written examination at the end of the study.
to know the main principles and methods of treatment of neurosurgical disorders.	Lectures, seminars and practical training at the department of neurosurgery and operating rooms.	Continuous assessment of practical training at the department of neurosurgery. Written examination at the end of the study

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**
NEUROLOGY									
1. Introduction to neurology. Overview of anatomy, physiology, development and pathology of nervous system.	2						**2**	**4**	to know the neuroanatomy and principles of functioning of nervous system, to learn the principles of topical diagnosis, main terminology and neurological syndromes.
2. Disorders of sensation. Topical diagnostics of disorders of somatic sensation.			2	2			**4**	**4**	to prepare for the practical training on the following items: Sensation: classification, disorders. Sensory tracts and their pathology. Neurologic examination: testing of sensory function.
3. Pyramidal system. Central and peripheral paralysis. Topical diagnostics of disorders of pyramidal system. Normal and pathological reflexes.			2	2			**4**	**4**	to prepare for the practical training on the following items: Pyramidal system. Upper and lower motoneuron. Pyramidal tracts and their pathology. Testing of motor function. Central and peripheral paralysis. Reflexes. Parts of the reflex arch. Classification of reflexes. Superficial and deep tendon reflexes. The etiology of elevated or decreased reflexes. Pathological reflexes and their categories. Testing of reflexes.
4. Extrapyramidal and coordination systems. Disorders, topical diagnostics.			2	2			**4**	**4**	to prepare for the practical training on the following items: Extrapyramidal system. The main pathological syndromes. Testing of extrapyramidal function. System of coordination. Cerebellar function, tracts of cerebellar hemispheria and vermis, their pathology. Types of ataxias. Testing of coordination.

5. Cranial nerves. Disorders, topical diagnostics.			2	2			**4**	**4**	to prepare for the practical training on the following items: Cranial nerves I-XII. Anatomy, physiology, symptoms of injury and irritation. Testing of cranial nerves. Bulbar and pseudobulbar paralysis. Brainstem crossed syndromes. Preparation for 1st colloquium.
6. Disorders of cortical functions.			2	2			**4**	**4**	to prepare for the practical training on the following items: The clinical syndromes of cerebral cortical dysfunction.
7. Disorders of autonomic nervous system. Clinical symptoms, topical diagnostics.			2				**2**	**4**	to prepare for the practical training on the following items: Autonomic nervous system. Anatomical classification. Innervation
									of pupil and pelvic function. Clinical symptoms and syndromes. Testing of autonomic function.
8. Laboratory and functional diagnostics in neurology. First colloquium.			2				**2**	**4**	to prepare for the practical training on the following items: Meningeal irritation syndrome. Testing of meningeal symptoms. Lumbar punction. Laboratory analysis of cerebrospinal fluid. Diagnostic measures in neurology: extracranial and transcranial ultrasound of cerebral blood vessels, computer tomography (CT) and magnetic resonance imaging (MRI) of brain and spine, functional visualization of nervous system (positrone emission tomography, PET; single protone emission computer tomography, SPECT), electrophysiological methods (electroencephalography (EEG), electroneuromyography (ENMG), evoked potentials), radiological methods (cranial and spinal X-ray, myelography, angiography of arch and branches of aorta and carotid arteries; examination of cerebrospinal fluid: production, circulation, volume, pressure, normal composition and pathology of cerebrospinal fluid, technique of lumbar punction, dynamic tests; muscle and nerve biopsy.

9. Disorders of peripheral nervous system.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Disorders of peripheral nervous system, etiology, pathogenesis, classification. Types of degeneration of nerve fibers: axonal and Wallerian degeneration, segmental demyelination. Neuralgia and neuropathy. Spinal disorders of peripheral nervous system. Plexalgias and plexopathies. Neuralgias and neuropathys of cranial nerves: trigeminal and facial neuropathy. Polyneuropathies: Guillan-Barre syndrome, chronic inflammatory demyelinating polyneuropathy; diabetic, diphtheric, alcoholic, paraneoplastic polyneuropathies; congenital and inherited polyneuropathies (Charcot-Marie-Tooth disease). Compression (tunel) syndromes; carpal tunnel sindrome, cubital tunnel syndrome. Treatment of diseases of peripheral nervous system.
10. Cerebrovascular diseases.	4		2	4			**10**	**10**	to prepare for the practical training on the following items: Cerebrovascular diseases. Etiology, pathogenesis, pathology, classification.
									Transient ischaemic attack (TIA). Reversible ischaemic neurological deficite (RIND). Stroke (brain infarction, ischaemic stroke). Treatment and prevention of ischaemic cerebrovascular disorders. Cerebral haemorrhage: intracerebral and subarachnoid haemmorhage. Treatment and prevention of haemmorhagic stroke. Disturbances of venous circulation of the brain: cerebral venous thrombosis. Brain vascular malformations: cerebral aneurysms, arterial and venous malformations. Acute hypertensive encephalopathy. Chronic ishaemia of brain. Disorders of blood circulation of spinal cord.
11. Infectious diseases of nervous system.	2			2			**4**	**4**	to prepare for the practical training on the following items: Infectious diseases of nervous system. Meningitis, classification: viral, bacterial, septic, serosal. Encephalitis, classification: primary, secondary; tick-borne, herpetic encephalitis. Brain abscess. Spinal epidural abscess. Acute poliomyelitis. Neuroboreliosis. Neurosyphillis. NeuroAIDS. Etiology, pathogenesis, pathology, clinics, diagnostics and treatment of infectious diseases of nervous system. Neurologic manifestations of COVID-19.

12. Extrapyramidal and movement disorders. Disorders of coordination.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Extrapyramidal and movement disorders. Parkinsonism. Parkinson‘s disease. Chorea and athetosis: Wilson‘s disease (hepatolenticular degeneration), Huntington‘s disease, rheumatic chorea. Dystonias: hemifacial spasm, blepharospasm, spastic torticollis. Tics. Tourette syndrome. Understanding tremor. Essential tremor.
13. Demyelinating disorders of central nervous system.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Demyelinating disorders of central nervous system. Multiple sclerosis. Acute disseminated encephalomyelitis. Central pontine myelinolysis. Myelitis.
14. Alzheimer‘s disease and other dementias.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Dementia: description, classification, clinical sindrome. Alzheimer‘s disease. Vascular dementia. Dementia with Lewy bodies. Frontotemporal dementias.
15. Consciousness and it‘s disturbances.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Syndromes of disturbed consciousness. Delirium. Coma. Vegetative state. Brain death.
16. Epilepsy.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Epilepsy. Etiology, pathogenesis, pathology, clinics, diagnosis, differential diagnosis, treatment.
17. Sleep disorders.			2				**2**	**2**	Phases of sleep. Investigations of sleep. Sleep disorders.
18. Headache.	2		2				**4**	**4**	to prepare for the practical training on the following items: Pathophysiology of pain. Headaches. Migraine. Tension-type headache. Cluster headache.
19. Vertigo and dizziness.			2	2			**4**	**4**	to prepare for the practical training on the following items: Types of dizziness and vertigo. Assessment of vestibular functions. Central and peripheral vertigo. Vestibular neuronitis. Benign paroxysmal vertigo.

20. Neuromuscular disorders. Diseases of motoneuron. Second colloquium.	2		2	2			**6**	**4**	to prepare for the practical training on the following items: Neuromuscular disorders. Diseases of motoneuron: amyotrophic lateral sclerosis, familial spastic paraplegia (Strümpell-Lorrain disease), inherited spinal muscular atrophies (Werdnig-Hoffmann, Kugelberg-Welander). Primary muscular diseases. Muscle dystrophies. Disorders of neuromuscular junction. Myasthenia. Myotonic disorders.
NEUROSURGERY									
21. Overview of neurosurgery.	1		1				**2**	**4**	to prepare for the practical training on the following items: Quantitive and qualitive assessment of consciousness, scales. Coma.
22. Neurophysiology.			1	1			**2**	**4**	Swelling and oedema of brain. Cerebrovascular autoregulation. Intracranial hypertension. Herniations of brain.
23. Craniocerebral trauma	1		1	2			**4**	**4**	to prepare for the practical training on the following items: Craniocerebral trauma. Examination of the patient. Epidemiology. Symptoms of mild, medium, severe brain injuries. Difuse and local brain injuries. Intracranial bleeding. Diagnosis, assessment of radiological examinations. Methods of treatment of traumatic patient: principles of conservative treatment, indications for surgery, types of operations, outcomes, prognosis.
24. Brain tumours	1		1	2			**4**	**4**	to prepare for the practical training on the following items: Brain tumours: classification,
									epidemiology, general and focal neurological symptoms. Supratentorial, infratentorial, sellar and pontocerebellar tumours: clinical symptoms, diagnosis. Alternative diagnostic methods. Principles of treatment. Indications for surgery, types of operations, outcomes, prognosis.

25. Cerebrovascular diseases.	1		1	2			**4**	**4**	to prepare for the practical training on the following items: Arterial aneurysms, arteriovenous shunts and malformations. Epidemiology, etiology, patogenesis. Spontaneous subarachnoid haemmorhage. Arterial vasospasm. Caroticocavernous fistule (shunt). Clinical symptoms of arteriovenous malformations. Diagnosis, assessment of radiological examinations. Methods of treatment: principles of conservative treatment, indications and optimal time period for surgery, types of operations, postoperative treatment, outcomes, prognosis. Surgical management of spontaneous subarachnoid haemmorhage.
26. Pathology of carotid and vertebral arteries	1		2	1			**4**	**4**	to prepare for the practical training on the following items: Pathology of carotid and vertebral arteries. Clinical symptoms, diagnosis, assessment of radiological examinations. Types of surgery, indications for operations, outcomes.
27. Spinal injury	1		1	2			**4**	**4**	to prepare for the practical training on the following items: Injuries of spine and spinal cord: vertebral fractures and luxations, injuries of spinal ligaments and muscles, disorders of intervertebral disc, injuries of spinal cord. Epidemiology, clinics, diagnostics, methods of treatment, principles of surgery, outcomes.
28. Degenerative disorders of spine	1		1	2			**4**	**4**	to prepare for the practical training on the following items: Degeneration of spine, degenerative disorders of spine: diseases of intervertebral disc, stenosis, lysthesis. Epidemiology, clinical symptoms, diagnosis, treatment, principles of surgery, outcomes
29. Oncological disorders of spine and spinal cord	1		1	2			**4**	**4**	to prepare for the practical training on the following items: The most frequent tumours of spine and spinal cord (metastases, neurinomas, meningiomas, gliomas, ependymomas), their epidemiology, clinics, diagnosis, methods of treatment, types of operations, outcomes
30. Disturbances of			2				**2**	**4**	to prepare for the practical training on
circulation of cerebrospinal fluid									the following items: Hydrocephalus in adults. Epidemiology, clinics, diagnosis, treatment, principles of surgery, outcomes. Brain atrophy and other degenerative disorders which may mimmick disturbances of circulation of cerebrospinal fluid. Syringomyelia, hydromyelia.

31. Surgery of peripheral nerves				2			**2**	**4**	to prepare for the following items: Carpal tunnel, cubital tunnel, thoracic outlet syndromes.
32. Functional neurosurgery			2				**2**	**4**	to prepare for the following items: Types of functional neurosurgery in epilepsy, pain and movement disorders
33. Neurosurgical disorders in children. Third colloquium.			2				**2**	**4**	to prepare for the following items: Deviations in development of neural tube, disturbances of circulation of cerebrospinal fluid in children, craniosynostosis, neurooncological disorders in children.
Total	**32**		**52**	**48**			**132**	**134**	

Assessment strategy	**Weight (%)**	**Deadline**	**Assessment criteria**
Cummulative grade during practical training (1): practical training at the departments of neurology and neurosurgery, in the labs of functional diagnostics and neurosurgical operating rooms.	20 %	Until the end of the neurology and neurosurgery training	**Student must be able:** - to take a history from the patient with neurological disease, evaluate the complaints, to perform neurological examination; - to assess the neurological symptoms, results of laboratory and functional examinations, analyse and synthesize all the information; - to make clinical judgements and decisions for further diagnostics and treatment options. The assessment is made on a 10-point scale. **The evaluation in neurology goes to the final score after multiplication by coefficient 0,1. The evaluation in neurosurgery goes to the final score after multiplication by coefficient 0,1.**
Cummulative grade during practical training (2): written colloquiums (tests) – 2 in neurology, 1 in neurosurgery.	30 %	Until the end of the neurology and neurosurgery training	The answers to the given questions of quizes are assessed according to their comprehensiveness, logicality of presented information and correctness. The assessment is made on a 10-point scale. **The average of the evaluation of three quizes goes to the final score after multiplication by coefficient 0,3.**
Examination	50 %	At the end of the neurology and neurosurgery training	The test consists of 60 questions of neurology and neurosurgery: 54 closed-type questions and 6 open questions, each evaluated in one point. Closed-type questions are graded 0 (incorrect) or 1 (correct). Open questions are rated from 0 to 1. The examination evaluation score is calculated on the total number of points obtained: **10:** Assessment level – 55-60 points. **9:** Assessment level – 49-54 points. **8:** Assessment level – 43-48 points. **7:** Assessment level – 37-42 points. **6:** Assessment level – 31-36 points. **5:** Assessment level – 25-30 points. **4:** Assessment level – 19-24 points. The minimal requirements are not met. **3:** Assessment level – 13-18 points. The minimal requirements are not met. **2:** Assessment level – 7-12 points. The minimal requirements
			are not met. **1**: Assessment level - ≤6 points. The minimal requirements are not met. The evaluation on a 10-point scale goes to the final score after multiplication by coefficient 0,5. **If the exam is graded 1-4 points (minimum requirements are not met), the subject is considered unfulfilled, regardless of the cumulative score during the cycle, and it is suggested to retake the examination.**

Author	Year of publication	Title	Issue of a periodical or vol. of a publication	Publication place and publisher or Internet link
Compulsary reading				
V.Budrys (ed.)	2009	Klinikinė neurologija. 2nd ed.		Vilnius, Vaistų žinios
I.Avižonienė (ed.)	1998	Nervų ligos		Vilnius, Avicena
L.Klumbys	2001	Nervų sistemos chirurgija		Kaunas, Naujasis lankas
G.Fuller	2019	Neurology Examination Made Easy. 6th revised edition.		Elsevier
J. Biller, G. Gruener, P. Brazis	2017	DeMyers The Neurologic Examination. 7th edition.		McGraw-Hill Education
Optional reading				
M. Endzinienė, G. Jurkevičienė, K. Laučkaitė ir kt.	2019	Neurologijos pagrindai. Antroji pataisyta ir papildyta laida.		Kaunas, LSMU Leidybos namai
M.Baehr, M.Frotscher	2019	Topical Diagnosis in Neurology. Sixth Edition.		Thieme
D. Collins. J. Goodfellow, D. Silva, R. Dardis, S. Nagaraja	2018	Neurology & Neurosurgery		JP medical publishers
V.Budrys (red.)	2011	Urgentinė neurologija		Vilnius, Vaistų žinios
A.H.Ropper, M.A.Samuels, J.P.Klein, S.Prasad (eds.)	2019	Adams and Victor‘s Principles of Neurology. 11th ed.		New York, McGraw-Hill Education
M.S.Greenberg	2010	Handbook of neurosurgery. 7th ed.		Thieme