



CD8.5.1 DISCIPLINE CURRICULUM

Edition: 08

Date: 21.02.2020

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FACULTY OF MEDICINE STUDY PROGRAM 0912.1 MEDICINE THE NEUROSURGERY DEPARTMENT

APPROVED

at the meeting of the Commission for Quality Assurance and Evaluation of the Curriculum faculty Medicine

Minutes No. of . 2021

President, Dr. hab.șt. med., associate professor
Suman Serghei _____

APPROVED

at the meeting of the Council of the Faculty of Medicine no.2

Minutes no. from . 2021

The Dean of the Faculty of PHD. med.,
associate professor
Mircea Bețiu _____

APPROVED

at the Neurosurgery Department meeting

Minutes No of 08.09.2021

Head of department, PhD med., associate professor
Galearschi Vasile _____

SYLLABUS

DISCIPLINE NEUROSURGERY

Integrated studies/Cycle I, Bachelor's degree

Type of course: **Compulsory discipline**

Curriculum developed by the team of authors:

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Chisinau, 2021



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I. INTRODUCTION

- ✓ General presentation of the discipline: the place and role of the discipline in the formation of the specific competences of the vocational / specialty training program
Knowledge of neurosurgery is extremely important for general practitioners, prospective family doctors and specialists in various fields of medicine. This is determined by the need to know the role of the nervous system in norm and pathology, addressing, in particular, diseases of particular social and social importance, such as stroke (ischemic and hemorrhagic), cranio-cerebral and vertebromedullary trauma, nervous system disorders peripheral (compressing) and others, which are frequently encountered in medical practice.
The course and practical exercises on neurosurgery are designed to allow the student to accumulate a certain amount of theoretical and practical knowledge in the given discipline. Towards the end of the neurosurgery cycle, the student should acquire the method of orientation in the diagnosis of neurosurgical diseases, which is able to provide medical assistance to patients with cerebral-cerebrovascular and vertebral-medullary, to be familiar with the general principles of neurosurgical interventions. General presentation of the discipline: place and role of the discipline in the formation of the specific competences of the professional / specialty training program
- ✓ The mission of the curriculum (purpose) in vocational training
 - a) Assimilation of practical examinations of the neurosurgical patient with the purpose of recognizing, locating and identifying the nature of the pathological process.
 - b) Correctly assessing the information received in the further investigations: electrophysiological, radiological, CT, MRI.
 - c) Establishing the clinical diagnosis of the neurosurgical diseases frequently encountered in medical practice, which offers the possibility of establishing appropriate treatment.
- Language (s) of the course: Romanian, English, French.
- ✓ Beneficiaries: students of the IV year.

II. MANAGEMENT OF THE DISCIPLINE

Code of discipline	S.07.O.060		
Name of the discipline	Neurosurgery		
Person(s) in charge of the discipline	PhD, associate professor Igor Gherman PhD, associate professor Vasile Galearschi		
Year	IV	Semester/Semesters	7/8
Total number of hours, including:			60
Lectures	10	Practical/laboratory hours	10
Seminars	10	Self-training	30
Clinical internship			
Form of assessment	EX	Number of credits	2

III. TRAINING AIMS WITHIN THE DISCIPLINE

At the end of the discipline study the student will be able to:

- *at the level of knowledge and understanding:*
 - etiology and pathogenesis of the most common neurosurgical pathologies;
 - correlation between etiology, pathogenesis and clinical features;
 - establishing the topical diagnosis based on defined clinical syndromes;



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- differential diagnosis in neurosurgery;
- the main instrumentary, imaging and laboratory instruments;
- principles of treatment in neurosurgery;
 - **at the application level:**
- collecting the anamnesis and evaluating the data about the nervous system functions;
- neurological examination;
- neuro-imaging bases (Rx, CT, angiography, CT-angio, -mielo, MRI);
- methods of examining and treating the patient in the urgent states of brain damage (brain stem dislocation, vascular disorders);
- first aid and transportation of patients with spinal trauma.
 - **at the integration level:**
- understand the importance of neurosurgery in medical practice;
- flexible interpretation of neurosurgical pathologies;
- the relationship between neurosurgery and other medical sciences;
- implementation and integration of neurosurgical knowledge in daily practice;
- making decisions in urgent neurosurgical treatment;
- elaboration of scientific research projects in the field of neurosurgery.

IV. PROVISIONAL TERMS AND CONDITIONS

Neurosurgery is a clinical medical discipline, the study of which at the university level will allow the creation of the necessary skills to support a correct diagnosis based on anamnesis, clinical and paraclinical examination, acquiring the notions and skills needed to highlight emergency neurological cases and frequent neurological diseases, as well as choosing the right curative management.

A student at the 4th course in the University needs the following:

- to know the language of instruction;
- preclinical skills;
- clinical skills;
- digital skills (being able to use the internet, to process the documents, electronic tables and presentation, using graphics software);
- communication and teamwork skills;
- the ability to communicate with the patients;
- qualities – intelligence, wisdom, tolerance, compassion, autonomy.

V. THEMES AND ESTIMATE ALLOCATION OF HOURS

Lectures, practical hours/ laboratory hours/seminars and self-training

No. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
1.	1. The subject of neurosurgery. 2. Spinal degenerative lesions. 3. Pediatric neurosurgery pathology. CNS and the cranio-vertebral congenital malformations.	2	4	6
2.	1. Brain and vertebro - medullar tumors. 2. Parasitoids. Instrumental diagnostic methods.	2	4	6
3.	1. Cranio-cerebral traumatic lesions (TBI).	2	4	6



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No. d/o	THEME	Number of hours		
		Lectures	Practical hours	Self-training
	2. Surgical endocranial septic processes (cerebral abscesses)			
4.	1. Cerebral vascular pathology. 2. Epileptic syndrome.	2	4	6
5.	1. Traumatic lesions of the spine and spinal cord (TSI). 2. Traumatic lesions of the peripheral nerves.	2	4	6
Total		10	20	30

VI. PRACTICAL WORKS PURCHASED AT THE END OF THE COURSE

The essential practical tasks are:

• **Examination of the patient with disordered knowledge**

1. reaction to pain stimuli (specification of metabolic stroke)
2. position of the eyeballs (conjugate deviation, strabismus, paresis of vision)
3. oculo-palpebral reflex (corneal, palpebral, blinking)
4. pupils (anisocoria, miosis, mydriasis)
5. symmetry of the face (paresis of the central and peripheral mimic muscles)
6. motor disorders (central and peripheral paralysis)
7. pathological signs of oral automatism
8. Meningeal signs
9. Glasgowscore

• **Examination of the conscious patient**

1. Function of language (fluency, comprehension, repetition and naming, dysphasia)
2. Memory (short-term and long-term)
3. Praxis, calculus, writing
4. Appreciation of apathetic disorders
5. Examination of olfactory function
6. Examination of visual function (visual acuity, visual field, c-m Bonne)
7. Examination of oculomotor function
8. Examination of tactile sensitivity and pain of the face and body
9. Examination of proprioception and sense of vibration
10. Examination of vestibulo-cochlear function (vertigo, hearing loss,)
11. Examination of position and gait (regular gait, fingertips and heels, tandem gait)
12. Examination of static and coordinating function (dizziness, fine finger movements, diadokokinesia, index finger-nose and heel-knee test, nystagmus, Romberg position)
13. Highlighting involuntary movements
14. Muscle strength test (mengazini test, upper and lower Barre test)

• **Examination of the patient with septic and aseptic CNS inflammation**

1. stiffness of the occipital muscles
2. Brudzinsk's sign: upper, middle, lower
3. the sign of Kernig, Veis- Edelman

• **Examination of the patient with spinal pathology and peripheral nerves**

1. Examination of muscle strength (mengazini test, upper and lower bar test) shoulder abduction, elbow flexion / extension, hand flexion / extension, finger flexion / extension / abduction, thigh flexion / extension, knee flexion / extension, plantar extension / flexion)
2. Examination of muscle tone



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3. Elongation marks (Lasegue, Neri, Bechterew, Wasserman, Shanley, Siquard, Turin)
3. G-spot differentiated by joint system pathology (Mazkiewich, Patric, Bonnet)

VII. REFERENCE OBJECTIVES OF CONTENT UNITS

Objectives	Content units
Theme (chapter) 1. 1. The subject of neurosurgery. 2. Degenerative spinal lesions. 3. Pediatric neurosurgery pathology. Congenital malformations of the CNS and the cranio-vertebral junction.	
<ul style="list-style-type: none"> • define the theoretical bases of contemporary neurosurgical physiology and pathology • to identify the anatomic physiological specificities determined by the age of the human body • to acquire the practical examinations of the neurosurgical patient for the purpose of recognizing the pathological signs with their semiotic evaluation in order to locate and identify the pathological process character. • acquainting the theology with different clinical forms • demonstrate clinical phases depending on the degree of herniation of the disc • apply for the proper evaluation of the information held in the further investigations: electrophysiological, radiological, CT, MRI • demonstrate the reasoning in appreciating the clinical diagnosis • estimate etiology, pathogenesis of congenital malformations of CNS and vertebral • define the notion of hydrocephalus • be familiar with hydrocephalus classification after onset, obstacle and accumulation • to know the clinical diagnosis of neurosurgical diseases commonly encountered in medical practice • to interpret the clinical manifestations of hydrocephalus forms • to know the basic principles of conservative and surgical treatment, which offers the possibility of appropriate treatment. 	<p>1 Emphasizing the need to separate neurosurgery into a separate teaching discipline. Stages of development of neurosurgery in the world and in Moldova. The prestigious neurosurgical schools and the role of scholars V. Horsley, H. Cushing, W. Dandy, L. Pussepp, H. Olivecrona, N. Burdenco, Th. Ionescu, A. Bagdasar. Achievements and perspectives in neurosurgery.</p> <p>2. Etiology, epidemiology of degenerative processes of the spine. Risk factors. Patmorphological classification by Schmorl. Disc herniation grades. The specific emitology of hernia disc and spondylosis. Clinical forms: cervical discogenic radiculopathy, cervical spondylo- myelopathy, thoracic spondylo- myelopathy, lumbar discogenic radiculopathy, Deprogenes-Getteron syndrome. Methods of paraclinical investigations (Rx.- functional, EMG, CT, MRI). Principles of diagnosis. Absolute and relative general surgical treatment. Indications of different methods and surgical approaches.</p> <p>3. Open and occlusive, hypersecretion, occlusive forms of hydrocephalus in children. Determination of occlusion level of cephalo-rachidian fluid pathways. Clinic of occlusive seizures. Surgical treatment of occlusive hydrocephalus by ventriculo-peritoneal derivatives and shunt (Baculev-Burdenco), ventriculo-atrial (Puden-Rassel), ventriculo-cisternal (Stukei, Torkilsen), ventriculo-thoracic, lombo-peritoneal. Prolonged drainage of the ventricular system by A. Arendt. Surgical treatment of craniostenosis and meningoencephalocelle.</p>
Theme (chapter) 2. Brain and cerebro-medullary tumors. Parasitosis. Instrumental diagnostic methods.	
<ul style="list-style-type: none"> • Define the notion of expansive process. • To know the etiopathogenesis of the nervous system tumors • know the classification of nervous system tumors • demonstrate the importance of the anamnestic in establishing the correct diagnosis • To know the clinical manifestations of tumors depending on their location • know intracranial hypertension syndrome • evaluate the results of the additional diagnostic investigations • apply paraclinical investigation methods in the diagnosis of cerebral and spinal tumor 	<p>1. Classification of brain tumors. Hypertension intracranial syndrome. Hearing and cerebral hernia. Front, temporal, parietal and occipital lobes. Saddle and perisellar syndrome. Poster posterior cranial syndrome. Metastatic tumors. Occlusive hydrocephalic crises of tumor origin, medical care.</p> <p>Method of tumor extirpation: extracerebral, intracerebral, hypophyseal adenomas, cerebral tumors, ventricol IV tumors, acoustic neurinoma;</p>



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Objectives	Content units
<ul style="list-style-type: none"> • to know the methods of treatment of nervous system tumors • Know the main abbreviations for ablation of brain and spinal tumors 	<p>2. Hidatic cysts (echinococcosis). Cerebral cysticercosis</p>
Theme (chapter) 3. 1. Cranio-cerebral traumatic lesions (TBI). 2.Surgical endocranial purulent processes (brain abscesses)	
<ul style="list-style-type: none"> • define the notion of TBI. • know the theories of pathogenesis and TBI biomechanisms • knows the TBI classification (types, severity, character) • to know the classification of the fractures of the skull (cap, base-closed, open, penetrating) • know clinical forms and TBI manifestations • classification of consciousness disturbances in TBI, GCS • evaluate the results of the additional diagnostic investigations • apply the classification and methods of paraclinical investigations in the diagnosis of TBI • to know the TBI treatment methods in the clinical form • knowing the main surgical treatment methods • define the notion of SIS (Septic IntracranialSurgery) • know the classification of abscesses and stages of training • Surgical treatment methods 	<p>1. General data. Classification and pathogenesis of TBI. TBI open. Shot-gun TBI. Classification of the skull fractures. Cranial wounds. Principles of primary surgical care of cranial wounds. Cerebral contusion. Localized traumatic laceration. Posttraumatic coma. Intracranial posttraumatic compression complications. Extradural hematoma. Subdural hematoma. Intracerebral hematoma. The dislocation and engagement of the cerebral trunk. Periods of evolution in TBI. Minimally invasive craniotomy through resection and osteoplasty. Evacuation technique for epidural, subdual, intracerebral hematomas. Consequences and complications of cranio-cerebral trauma. Indications and contraindications for bone grafting. Various methods of bone gap grafting.</p> <p>2. General data. Classification of primary and secondary abscesses, pathogenesis. Stages and clinical manifestations. Surgical treatment of cerebral and cerebellra abscesses by puncture or capsule evacuation. The abscess drainage method. Prophylaxis of recurrences of abscesses by long term drainage and lavage of abscess locus in the postoperative period.</p>
Theme (chapter) 4.1. Cerebral vascular pathogens. 2. Epileptic syndrome.	
<ul style="list-style-type: none"> • know brain vascularization and self-regulation mechanisms • define stroke and its types • Clinical forms of haemorrhagic stroke (primary, "spontaneous", secondary, causes) • to know the clinical manifestations (syndromes) of hemorrhagic stroke in the clinical form • to have clinical forms of aneurysms, arterio-venous malformations, difference, cause • to know causes and clinical manifestations of the carotid-cavernous fistula • apply examination and treatment methods • to know the difference in the treatment tactic of the spontaneous intracerebral hematoma with the traumatic one • to know causes and clinical manifestations of "cerebral infarction" • to know differential diagnosis between hemorrhagic stroke and ischemic stroke • interpret CT imaging and MRI imaging • demonstrate the importance of the Doppler Ultrasound method for preoperative indications such as prophylaxis and recovery of patients with cerebral infarction 	<p>1. Cerebral vascular pathology. Clinical forms of the hemorrhagic stroke. Intracerebral aneurysm. Cranio-cerebral vascular malformations. Carotid-cavernous fistula. Spontaneous intracerebral hematoma. Imaging methods (CT, CT- angio, classical angiography). Vascular ischemic strokes "cerebral infarction". Cases. Physical exam. Methods of treatment.</p> <p>2. Types cerebral and dural scaring. Indications for surgical treatment. Stereotactic treatment of post-traumatic temporal lobe epilepsy.</p>
Theme (chapter) 5.1. Traumatic lesions of the spine and spinal cord (TSI). 2. Traumatic lesions of the peripheral nerves.	
<ul style="list-style-type: none"> • define the notion and classification of TSI (types, character, notion of stability) • to know TSI biomechanics • know the classification of spinal cord injuries • demonstrate the importance of vascular types in the 	<p>1. Generalities. Classification and pathogenesis of TSI. Open TSI. Gun – shut TSI. Classification of spinal lesions by type and level. Classification of clinical forms. The notion of spinal shock. Evolutionary classification of medullary injuries.</p>



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Objectives

pathological process

- to know clinical forms and manifestations according to severity and severity (para- , tetra- , hemi- , central and peripheral monoparesis)
- to know the methods of paraclinical investigations (Rx, myelography, CT, CT-mielography, MRI, EMG)
- apply the classification and methods of paraclinical investigations in the TSI diagnosis
- know the indications and principles of surgical treatment methods
- knowing the classification and general syndromes of total or partial lesions of nerve trunks
- be familiar with tunnel classification and tunnel localization
- interpret the results of the paraclinical investigations
- the results assessment of the applied methods of treatment

Content units

Clinical manifestations of incomplete medullary injury (anterior, posterior, Brown-Sequard, total transverse - by the level: upper cervical, cervical, chest, thoracic, lumbar intumescence, medullary cone, horse tail, neurologic status according to ASIA/ IMSOP classification. Stukei, Cvikenstedt, etc. The sub-occipital puncture paraclinical imaging and electrophysiological diagnosis phases of treatment in TSI.Surgical treatment, preoperative indications and choice of approach.

2. Classification of closed and open, patho-histological lesions. General syndromes. Clinical manifestations according to syndromes affecting various nerve trunks of upper and lower limbs. Tunnel syndrome. Preclinical exam (EMG, ENG, PEM, PESS). Forms and types of microsurgical treatment

VIII. PROFESSIONAL (SPECIFIC (SC)) AND TRANSVERSAL (TC) COMPETENCES AND STUDY OUTCOMES

Professional (specific) (SC) competences

- **CP1.** A thorough knowledge of the particularities of the structure, development and functioning of the nervous system in various physiological and pathological conditions.
- **CP2.** Conducting various practical exercises and procedures for carrying out the professional activities specific to the Neurosurgical specialty based on the knowledge of the fundamental sciences.
- **CP3.** Elaboration of the diagnosis, treatment and rehabilitation plan in various pathologies of the nervous system and selection of appropriate therapies for these, including the provision of emergency medical assistance.
- **CP4.** Use of medical techniques, instrumental and laboratory investigations, digital technologies to solve the specific tasks of the therapeutic neurosurgical patient.
- **CP5.** Planning, coordinating and conducting health promotion activities and prophylactic measures to improve health at the individual and community level.
- **CP6.** Assessment and quality assurance of medical services in relation to manpower, processes and associated treatments.

Transversal competences (TC)

- **CT1.** Autonomy and responsibility in the activity.

Study outcomes

- To know the definitions and classifications of nervous system pathologies.
- To understand the etiopatology of nervous system diseases.
- Possess the neurological examination of the nervous system patient based on the clinical procedures (anamnesic, objective physical examination, topographical diagnosis).
- Define the indications and contraindications of the various additional diagnostic methods used in neurology.
- To demonstrate the ability to develop an additional (laboratory, electrophysiological and imagistic) diagnostic plan of the patient with neurological disease and the ability to argue diagnosis based on the results of the investigations performed.



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- Know the principles of treatment of different neurological diseases according to contemporary requirements, prioritizing different classes of drugs according to established diagnosis.
- Know the principles of prophylaxis of diseases of the nervous system and carry out health promotion activities and prophylactic measures to improve health at the individual and community level.
- Know the basic principles of rehabilitation of patients with diseases of the nervous system.
- Be aware of the importance of studying neurology in the process of training the future physician capable of defining the primary affection of the nervous system as well as of other somatic diseases.
- Possess the ability to analyze and synthesize the results of clinical work in scientific research projects.
- To have the ability to work in a team based on the spirit of initiative, dialogue, cooperation, positive attitude and respect for others.

Note. Study outcomes(are deduced from the professional competencies and formative valences of the informational content of the discipline).

IX. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with information sources	<p>Read carefully the lecture or the material in the handbook on the topic.</p> <p>Reading questions on the subject, which requires a reflection on the subject.</p> <p>Familiarize yourself with the list of informative sources on the topic.</p> <p>Select the source of additional information for the theme.</p> <p>Reading the text thoroughly and writing the essentials.</p> <p>Wording of generalizations and conclusions regarding the importance of the theme / subject.</p>	<p>Ability to extract the essentials;</p> <p>interpretative skills;</p> <p>the volume of work</p>	During module
2.	Working with the patient	<p>Communication and examination of the patient with neurosurgical pathology according to the thematic plan: interrogation, objective neurological examination of the patient, systematization of information obtained in clinical syndromes, establishment of topographic diagnosis.</p> <p>Develop an investigation plan. Analysis of the results obtained.</p> <p>Diagnosis argument. Choice of non-medication and medical treatment.</p> <p>Formulate conclusions at the end of each lesson. Verifying the endings of the lesson and appreciating the achievements.</p> <p>Selection of additional information, using e-mail addresses and additional bibliography.</p>	<p>The volume of work, solving clinical cases, tests,</p> <p>the ability to formulate conclusions</p>	During module
3.	Apply different learning	Situational issues projects	<p>Level of scientific argumentation, quality of conclusions, elements of</p>	During module



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	techniques		creativity, demonstration of understanding the problem, formation of personal attitude	
4.	Work with online materials	Online self-assessment, study of online materials, expressing your own opinions through forum and chat	Number and duration of forum entries and chat, self-assessments results	During module
5.	Preparing and supporting clinical cases	Selection of the patient with neurosurgical pathology for clinical observation record, establishment of the research plan, setting of the terms of realization. Establishing the patient for case presentation. PowerPoint - theme, purpose, results, conclusions, practical applications, bibliography.	Volume of work, level of scientific argumentation, elements of creativity, personal attitude formation, coherence of exposure and scientific correctness, graphic presentation, way of presentation.	During module

X. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

✓ *Teaching and learning methods used*

When teaching Neurosurgery, different methods and procedures are used, oriented towards the efficient acquisition and achievement of the objectives of the didactic process. In the theoretical lessons, along with traditional methods (lesson-exposure, lesson-conversation, synthesis lesson), modern methods (lesson-debate, lecture-conference, problem-lesson) are also used. Practical forms of individual, frontal, group, virtual clinical cases, projects are used in practical lessons. In order to acquire deeper material, different semiotic systems (scientific language, graphical and computerized language) and teaching materials (tables, schemes, radiographic images, computed tomography, magnetic resonance imaging, electroencephalographs, electroneurography, electromyography) are used. Within the lessons and extracurricular activities are used information technologies for communication - Power Point presentations.

✓ *Applied teaching strategies / technologies (specific to the discipline)*

"Brainstorming", "Think Pairs-Presents", "Multi-voting", "Round Table", "Group Interview," "Case Study," Creative Controversy, "Focus Group.

• *Methods of assessment (including the method of final mark calculation)*

✓ *Current: frontal and / or individual control by:*

- (b) solving the situational problems,
- (c) analysis of clinical cases,
- (e) reports.

Final: verbal exam (EX)

The final grade will consist of the **annual average** (average of two totalizations (summative assessment: neurological semiology and neurosurgical pathology) (share 50%), test-grid (20%) and the mark of the verbal exam (EX) with the answer consisting of questions on related topics (30% share).

Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	2	F
3,01-4,99	4	FX
5,00	5	E
5,01-5,50	5,5	



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5,51-6,0	6	
6,01-6,50	6,5	D
6,51-7,00	7	
7,01-7,50	7,5	
7,51-8,00	8	C
8,01-8,50	8,5	B
8,51-8,00	9	
9,01-9,50	9,5	A
9,51-10,0	10	

The average annual mark and the marks of all stages of final examination (computer assisted, test, oral) - are expressed in numbers according to the mark scale (according to the table), and the final mark obtained is expressed in number with two decimals, which is transferred to student's record-book.

Absence on examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student has the right to have two re-examinations.

XI. RECOMMENDED LITERATURE:

A. Compulsory:

1. Neurosurgery (European Manual of Medicine), Christiano B. Lumenta, Springer, 2010

B. Additional

1. Essential Practice of Neurosurgery, Kazadi K.N. Kalangu, Springer, 2009
2. Handbook of neurosurgery, Mark S Greenberg, 7th edition, Thieme. 2017
3. Textbook of Neurosurgery, Ramamurthi and Tandon, 3rd edition, 2013