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Introducing Problem Based Learning in Moldova: Toward Enhancing Students' Competitiveness and Employability

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Medicine:
Pilot Student-Centred Active-Learning Study Programme

SUMPh „Nicolae Testemițanu"

Work Package 3

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1 INTRODUCTION

In line with the requirements of the project „Introducing Problem Based Learning in Moldova: Toward Enhancing Students' Competitiveness and Employability", funded by the European Commission under the European Programme Erasmus Plus, we present the project's 3rd Work Package for analysis.

Taking into account the purpose of the project aimed at consolidating the institutional capacities of 6 higher education institutions from the Republic of Moldova focused on improving the quality of study programmes and the methodology of teaching-learning, we propose to introduce in the curriculum of SUMPh "Nicolae Testemitanu" the progressive methods of education based on problems and their adjustment to the performance indices towards which our University is oriented.

The basic mission of the State University of Medicine and Pharmacy "Nicolae Testemitanu" is defined by its key role in the process of reforming both the medical higher education and the health system in the country. Aligning to everything modern in university education, developing and deepening research and innovation activities in the field of medicine, rhythmical deployment of clinical work are the three components that determine the current image of the University.

One of the academic principles underlying the training activity in the University is the principle of quality, which provides for the reporting of training activities to national and international standards. These are found in the objectives of the *Development Strategy of SUMPh "Nicolae Testemitanu" for the period 2011-2020*, which provides for the integration of the graduates into the labor market by capitalizing the competences acquired during the study years.

SUMPh "Nicolae Testemitanu" accomplishes its mission based on the University Charter which stipulates the achievement of the following objectives:

a) creating, maintaining and disseminating knowledge at excellence level;
b) training of highly qualified specialists competitive on the national and international labor market;
c) development of scientific research in accordance with national and international standards, including in collaboration with institutions in the country and abroad;
d) ensuring the provision of qualified medical and pharmaceutical services;
e) creating lifelong learning opportunities;
f) preservation, development and promotion of national cultural-historical values in the context of cultural diversity.

Curricular reform requires continuing critical analysis, systematic evaluation, updating and compatibilization of graduate and postgraduate study programmes with the needs of the European and national health system.

Continuous professional training according to European Union standards requires the improvement of the training process, improvement, objectification and transparency of the evaluation system of both the knowledge and the practical skills of students and residents, including under the conditions provided by the University Center for Simulations in Medical Training.

One of the primary objectives of the University is the organization of modern, flexible medical and pharmaceutical higher education in accordance with national and international standards, in line with the requirements of the Bologna Declaration.

The current curricular reform aims at substantially renewing study programmes, capitalizing new educational offers, applying the European transferable academic credit system, implementing modern information technologies, advanced forms and methods of teaching-learning-evaluation.

In order to achieve the objectives of the PBL project in the Republic of Moldova it is necessary to approach the progressive and innovative methods in the training process such as problem-based learning (PBL) and simulations, as well as the re-organization of the study programme.

The students of the SUMPh "Nicolae Testemitanu" meet with PBL elements, even from the first year of studies, and subsequently at all clinical disciplines, so we consider that there is no need for a radical change of the curriculum, but only the adjustment of certain programmes containing several elements of problem-based learning that would facilitate the education process of students in a new and constructive format oriented towards:

a) developing teamwork skills;
b) engaging and encouraging critical thinking and intellectual competiveness;
c) creating the conditions for the development of creativity;
d) exchange of views and analysis of proposals submitted by team members;
e) stimulating decision-making autonomy and procedures to resolve the situation in case of failure;
f) active collaboration of students both at the group level and with the facilitator at all stages of problem solving.

Because the PBL model involves teamwork, there is a need to restructure the educational process and create small groups of students (7-8 people), thus referring to our University's study programme the implementation of the PBL project would be optimal starting with the third year of studies at the Faculty Public Health, which currently has the smallest number of students.

From the literature analyzed we conclude that the PBL model encourages the development of communication skills, critical thinking, competitiveness, presenting opinions and ideas, development of analytical capacities, focusing on solving the problem.

Because problem-based learning is student-centered, it will help change the way the problem is addressed and capitalize all the possibilities and methods to solve the problem, and the student will develop new skills and abilities oriented towards the achievement of the task.

One of the major factors that would allow successful implementation of the project in the medical higher education in the Republic of Moldova is the motivation, encouragement and active involvement of students in the problem-based learning process with the assigning of autonomy and taking responsibility in decision-making, which would ultimately contribute to obtaining the necessary skills for the profession of doctor.

Focusing education on the beneficiary is in accordance with the stipulations of art. 7 of the Education Code of the Republic of Moldova dated 17.07.2014 ([1]published in the Official Gazette of the Republic of Moldova, no. 319-324 of 24.10.2014), which shows that the implementation of the

problem-based education is also a prerogative of the Ministry of Education of the Republic of Moldova.

In spite of the fact that the graduates of SUMPh "Nicolae Testemitanu" have obtained theoretical knowledge and practical skills during their studies at the faculty, which successfully enable them to work in the field of medicine, we believe that the implementation of new methods of education and training of the staff in the Health System of the Republic of Moldova will contribute to increasing the competitiveness of our graduates not only on the domestic market, but also internationally.

As the PBL project involves not only reshuffles at programme level but also adequate logistical support, both academic and administrative staff have been chosen in the working group.

Work team members analyzed the study programmes of the partner universities in the European Union, which were collected during the mobilities at Aalborg University, Denmark, and the University *Peninsula School of Medicine and Dentistry* in Plymouth, UK.

Table 1. Work team - SUMPh "Nicolae Testemitanu"

Members of the working group SUMPh „Nicolae Testemitanu"	Scientific and didactic title, position held
Gavriliuc Mihail	Univ.Prof., Vice-Rector for International Relations, SUMPh „Nicolae Testemitanu"
Vovc Victor	Univ.Prof., Head of Department of Human Physiology and Biophysics, SUMPh „Nicolae Testemitanu"
Cemortan Igor	Associate Professor, Head of Department of Molecular Biology and Human Genetics, vice-dean of the Faculty of Medicine no. 2, SUMPh „Nicolae Testemitanu"
Babuci Angela	Assistant lecturer, Vice-dean of the Faculty of Medicine no. 2, SUMPh „Nicolae Testemitanu"
Mînăscurtă Nicoleta	Methodist, Department of Foreign Relations and European Integration, SUMPh „Nicolae Testemitanu"

Visits to partner universities in the European Union have been informative and very useful. During these visits we had the opportunity to get acquainted with the PBL training methodology, we also initiated the cooperation process of SUMPh "Nicolae Testemitanu" with the partner universities in the EU.

Thanks to the mobility organized within the project we have gained experience with regard to the problem-based learning methodology, we have documented on the organization of the medical training process and we have learned how to elaborate and the stages of the implementation of the study programmes and their integration in universities at different hierarchical levels such as: management at the level of university, faculty, departments and other university subdivisions.

During the mobility period, we participated in daily curricular and extracurricular activities taking place at the universities of Aalborg and Plymouth.

We attended practical workshops, lectures, roundtables organized by host universities and coworked to create a flow of inter-university academic mobility on the training of teaching staff from the State University of Medicine and Pharmacy “Nicolae Testemitanu” in Moldova regarding the methodology of problem-based learning.

We analyzed the study programmes at Aalborg and Plymouth universities and got to the conclusion that they have a well-structured curriculum covering the three core objectives of problem-based learning, namely:

a) exceptional clinical education;
b) high rate of employment;
c) research at international standards.

Undoubtedly, problem-based learning is a progressive method of student-centered education with interdisciplinary integration and analysis of case-problems in teams.

Work Package 3 represents a detailed analysis and structuring of the experience gained during the implementation of the project’s objectives and includes:

a) data and findings described in the reporting reports on mobilities at partner universities in the European Union;
b) the methodology used for data collection and analysis;
c) the analysis of the medical education system of the Republic of Moldova (Bachelor’s degree level);
d) comparative analysis of higher education systems in our country, Denmark and the UK;
e) conclusions on comparative analysis of health education systems;
f) the action plan and the roadmap for the implementation of the pilot module “Neuroscience” in the specialty Public Health in the third year of university studies.

The Faculty of Medicine of the State University of Medicine and Pharmacy (SUMPh) "Nicolae Testemitanu" of the Republic of Moldova is a scientific, curative, and cultural center of graduate, postgraduate, residential and continuing training of physicians/doctors and pharmacists from the Republic of Moldova. SUMPh “Nicolae Testemitanu”, according to the Government Decisions of the Republic of Moldova No. 363 of 25.07.1991 and No. 705 of 18.12.1996, is the successor of the State Medical Institute in Chisinau, founded in 1945.

The University operates on the basis of the Constitution of the Republic of Moldova, the Education Code of the Republic of Moldova of 17.07.2014, the WHO Concept, other legislative and normative acts, including international treaties and pacts to which the Republic of Moldova is a party, such as “The Lima Declaration on Academic Freedom and Autonomy of Institutions of Higher Education” (1988), “The Magna Charta of European Universities” (Bologna, 1988), the Bologna Declaration (1999), etc., as well as the Charter of the State University of Medicine and Pharmacy “Nicolae Testemitanu” from Moldova.

Since 1990, the State Medical Institute in Chisinau is named after Nicolae Testemitanu (1927-1986) – Honored Person, illustrious scholar, talented pedagogue and educator, state man,

experienced public health organizer who contributed substantially to the organization and development of the health care system in our country; was a militant promoter of the national rebirth, sovereignty and independence of the Republic of Moldova.

On July 25, 1991, the State Medical Institute “Nicolae Testemitanu” in Chisinau was reorganized into University. In 1996 the institution was given a new name - State University of Medicine and Pharmacy “Nicolae Testemitanu” of the Republic of Moldova.

We are planning to implement the PBL pilot module “Neuroscience” within the Faculty of Medicine no.1, where the Public Health specialty is provided.

2 ACTION PLAN FOR THE WORK PACKAGE 3

2.1 PURPOSE AND OBJECTIVES

Curricular reform of the study programme at the Faculty of Medicine no. 1, Public Health specialty, and modernization of the higher medical education programme in the Republic of Moldova in accordance with the Bologna Process through the implementation of a pilot module "Neuroscience":

1. Elaboration of a new curriculum for the Faculty of Medicine no. 1 at the Public Health specialization according to the methodology "Problem-based learning and simulation in medicine".
2. Analysis of the analytical programmes of the disciplines to be integrated into the PBL "Neuroscience" interdisciplinary module and elaboration of a new analytical programme according to the PBL curriculum standard in the partner universities of the project.
3. Approval of the "Neuroscience" module at all university-level instances.
4. Identification of facilitators from among the academic staff and their involvement in the implementation of the interdisciplinary PBL "Neuroscience" module.
5. Arrangement of study rooms with equipment necessary for the implementation of the programme.
6. Teaching staff mobility and familiarization with PBL training methods in EU partner universities.
7. Training of the academic staff and programme managers of SUMPh "Nicolae Testemitanu" with regard to PBL methodology by foreign partners.
8. Designing cases for PBL under the guidance of our European Union partners.
9. Implementation of PBL in SUMPh "Nicolae Testemitanu".
10. Mobility of Moldovan students in EU universities.
11. Testing the new study programme:
    a) the results obtained at the examination session;
    b) anonymous questioning of students.
12. Final implementation of the PBL and continuous improvement of the new study programme.
13. Employment rate of graduates trained by using the PBL method and comparative analysis with the employability of graduates trained by using traditional methods.

2.2 ROAD MAP

	2015			2016												2017											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Establishment of the working group																											
Researching good international practices																											
Obtaining approval of derogations submitted to ME																											
Creating the programme structure																											
Dissemination of the new programme																											
Development and implementation of a new programme questionnaire																											
Approval of the new curriculum																											
Implementation of the new programme																											

3 "NEUROSCIENCE" PILOT PROGRAMME FOR THE "PUBLIC HEALTH" SPECIALTY

3.1 INTRODUCTION

The PBL-based "Neuroscience" study programme for the "Public Health" specialization was developed based on the University's previous experience in the field of problem-based learning, with the help of information acquired as a result of the visit to Plymouth University Peninsula School of Medicine and Dentistry (PU PSMD) in UK on the organization and deployment of PBL and the support of colleagues from Aalborg University (AAU), Denmark.

The primary purpose was to compare the organization of education based on PBL at the faculties of medicine, focusing on the specifics of medical education. There are big differences in the organization of higher medical education in the UK compared to the Republic of Moldova, which makes it impossible to copy the format of the study process deployment, which requires adaptation to the realities of our country. At the same time, the goal proposed in various universities using PBL is to focus on the individual activity of students, to plan a larger number of practical hours, compared to theoretical ones, to carry out some projects.

The accumulated data and suggestions have led to the creation of a multidisciplinary pilot programme based on student-centered learning. The pilot programme is a multidisciplinary programme in "Neuroscience" involving the co-operation of several teaching subdivisions. This programme is intended for students from the Faculty of Public Health, 3rd year, 2nd semester. The selection was based on the relatively small number of faculty students, and in the second year, semester II, the students are familiar with most of the preclinical subjects, which makes it possible to strengthen the studied subjects at a higher level.

3.2 PILOT PROGRAMME

The "Neuroscience" multidisciplinary course is based on the discipline of "Neurology" and aims at studying the physiological and pathological changes of the nervous system according to the neural substrate and causative factor, the multilateral examination of the relevant relationships between the structure and the internal organization of the nervous system and the law of syndromology and topic diagnosis.

3.2.1 Learning objectives within the discipline

At the level of knowledge and understanding

- To define the theoretical foundations of contemporary neurology;
- To identify the anatomical-functional features of the nervous system;
- To highlight topographically the place and the weight of different structures, formations and areas of the nervous system in performing the concrete functions and neurological syndromes as a whole;
- To determine the topical diagnosis based on defined clinical syndromes;

- To report about etiopathogenesis, clinical manifestations, diagnosis, principles of treatment and prophylaxis of neurological diseases.

At the application level

- To collect the anamnesis and evaluate the data about the functions of the nervous system;
- To perform the special neurological examination on systems;
- To apply diagnostic methods in neurological diseases;
- To evaluate the results of clinical samples and tests, additional diagnostic investigations to assess the functional status of the nervous system;
- To apply the methods of examining the patient in emergency situations.

At the integration level

- To appreciate the importance of neurology in the context of Medicine and integration with related medical disciplines;
- To appreciate the evolution of physiological processes and the etiology of the pathological processes of the nervous system;
- To supervise pathological processes and to use the methods of investigation, treatment and prophylaxis of nervous system diseases;
- To appreciate the results of diagnostic methods in neurological diseases;
- To make optimal decisions in providing emergency medical aid in critical situations;
- To develop scientific research projects in the field of neurology.

Given the SUMPh's experience in organizing a "Neuroscience" Summer School and the recommendations of the European partners, the team established to develop the pilot study programme based on PBL proposes it to be implemented from February 2018. The experience of implementing this pilot programme will help identify key impediments and to develop a strategy of improvement and adjustment to the new established objectives, which will contribute to the implementation of PBL in other medical disciplines.

Educational policy is a topic of central interest and a basic practice in SUMPh „Nicolae Testemitanu". The mobilization of the university community found the expression in the phenomenon of the Bologna Process, which was introduced in the Republic of Moldova in 2005 through the operation of the amendments and completions to the Law on Education no. 547 of 21.07.1995. The Bologna Reform in the SUMPh „Nicolae Testemitanu" was promoted in particular by the uninterested and devoted contribution of the university managers, who assumed the status of reform experts and promotors, without remuneration and additional expenses from the state budget. So far, it has been possible to change educational plans, to reform the university curricula, to introduce the European Credit Transfer System, to develop and to implement the European Diploma Supplement, to structure the quality management systems of the university processes. One of the main directions of the reforms was the organization of the system of internal and external quality evaluation and monitoring through the implementation of the Quality Management System in the University.

The analysis of the quality of university education in the Republic of Moldova through the provisions of the Bologna Process raised a fundamental question - the absence of the external

evaluation mechanisms of the higher education institutions in parallel with the internal mechanisms of the institutions.

On December 11, 1999, the National Council for Academic Evaluation and Accreditation (CNEAA) was established by Government Decision, besides the Government of the Republic of Moldova. This Council operated the first accreditations, but in 2002 this semi-autonomous institution was liquidated and responsibility for accreditation transferred to the Division of Higher Education Accreditation of the Ministry of Education. Starting with 2008, the Ministry of Education no longer evaluates and accredits higher education institutions and study fields due to the lack of an adequate structure. Consequently, the Republic of Moldova does not have an adequate regulatory base and an institutional system for regulating and monitoring quality in accredited educational institutions, violating the principle of periodic evaluation and accreditation of educational service providers.

SUMPh "Nicolae Testemitanu" was accredited in 2001, according to the Government Decision of the Republic of Moldova no. 574 of 05.07.2001, and in 2007, according to the Decision of the College of the Ministry of Education and Youth no. 8.5.1 of July 19, 2007 (periodic accreditation).

In 2005, the Faculty of Medicine of SUMPh "Nicolae Testemitanu" was evaluated by the CIDMEF external evaluation commission. The purpose of the external evaluation commission's visit was to validate institutional self-analysis and assessments made. This visit helped to promote the motivation of faculty members and the objectivity of self-analysis.

Currently, SUMPh „Nicolae Testemitanu" operates on the basis of accreditation made in 2007 by the Specialized Academic Evaluation and Accreditation Commission of the Accreditation Department of the Ministry of Education and Youth of the Republic of Moldova. The Commission has conducted its work on the basis of: 1) Order of the Minister of Education and Youth of the Republic of Moldova no. 126 of 07 March 2007; 2) Law on Evaluation and Accreditation of Education Institutions of the Republic of Moldova no. 1257-XIII of July 16, 1997; 3) The Regulation on the operation of the Specialized Academic Evaluation and Accreditation Commissions of Higher and Postgraduate Institutions; 4) Set of support materials (Table. The results of the evaluation and appreciation of the activity carried out at the specialties; Questionnaires: 1. The quality of the conditions of professional activity 2. Higher education - access and quality 3. Evaluation of the teacher's dactic-methodical activities (A. Theoretical course quality; Quality of practical activities).

The Standards of the International Standardization Organization (ISO) have been implemented in the health education system, which requires regular re-evaluation of the educational system according to national and international standards.

Following the accession of the Republic of Moldova to the Bologna process, the SUMPh started to develop its own Quality Management System (QMS), which has the role of generating confidence in the University's ability to provide quality services (professional training, training, research, design, consulting, etc.). The quality assurance policy in the SUMPh is developed by the Rector with the participation of the RMC and provides management's commitment to meet the requirements of the beneficiaries, continuously improving the effectiveness of QMS. The internal audit is performed to determine the extent to which the QMS requirements are met; evaluate the

effectiveness, functionality and identify opportunities for quality improvement. Internal audits are scheduled by the RMC / Vice-Rector for Quality Assurance and integration in education at the beginning of each academic year, taking into account the importance of the audited processes and subdivisions, the results of previous audits. The Audit Group consists of University staff trained and certified for this purpose through internal or external courses under the guidance of the RMC. The audit report, together with the corrective action requests initiated, is transmitted by the audit team chairman to the head of the audited subdivision.

At present, the curriculum of the Faculty of Medicine is classical, linear, based on disciplines. The educational plan includes fundamental disciplines, specialized and socio-humanistic disciplines, which are structured in compulsory and optional disciplines. The studies include theoretical courses, seminars and practical works, clinical internships, optional courses, and diploma thesis as part of the Graduate State Exam.

The educational plan is well structured, the curriculum's general guidelines include: student orientation, individual requirements; process focusing; opening to present and future needs; quality management, open educational environment, internationalization of training in terms of content and performance criteria. The weight of the disciplines is expressed in study credits (ECTS - 60 credits / year and 360 credits / faculty) and ensures good student mobility among international education institutions. The institution regulates the procedure of promoting the student from one year of study to another, depending on the accumulated study credits.

The curricular programme base is interdisciplinary and transdisciplinary, taking into account social, global, national, regional / local needs. **The content is organized** in such a way as to facilitate the contextualization and application of knowledge in different disciplines.

Examples of **horizontal integration** (concurrent) **would be the integration of the themes** of fundamental sciences: such as Anatomy - Histology (Position, anatomical projection on systems and organs / Microscopic and ultramicroscopic structure of healthy person's cells, tissues and organs); Biology - Histology (Cell's structural particularities / Particularities of cell functionality); Biochemistry - Physiology (Structure and properties of biological membranes / Membrane transport; Structure, biosynthesis, regulation of secretion, mechanisms of action of hormones / Physiological effects of hormones); Physiopathology - Morphopathology (Physiopathology of the respiratory, cardiovascular, excretory system / Morphological changes in the pathological processes of the respiratory, cardiovascular, excretory system) or the integration of the clinical disciplines: Radiology - Surgery-Semiology (Radiodiagnostics of traumas and diseases of the osteoarticular apparatus; respiratory system / Semiology of surgical diseases of the locomotor apparatus; respiratory system); Gastroenterology - Surgical diseases (Pathology of the small and large intestine. Definition, etiology, pathogenesis, diagnosis, clinic, treatment, prophylaxis, prognosis / Surgical pathology of the small intestine, large intestine); Endocrinology - Surgical diseases (Disease of the thyroid, toxic diffuse goiter, thyrotoxic adenoma, autoimmune thyroiditis, fibrous thyroiditis, subacute thyroiditis, endemic goiter, hypothyroidism, thyroid cancer, Surgical pathology of the thyroid gland).

As shown above, the Bachelor's degree study programme "Public Health" is structured on two cycles: preclinical and clinical. However, some of the clinical disciplines are introduced in the first semesters, and fundamental subjects are taught in the clinical cycle (students' contact with patients

takes place early in the second semester in compulsory discipline Primary Health Emergency; fundamental disciplines in year III (Pharmacology, Morphopathology, Physiopathology) are taught in parallel with Internal Medicine Semiology and Surgery – Semiology; some disciplines like Clinical Pharmacology (compulsory), Clinical Biochemistry, Clinical Microbiology, Clinical Physiopathology, Clinical Morphopathology (optional) are taught in IV, V, VI academic years in parallel with the medical disciplines; and at the end of the 2nd and 3rd year the students have to do the summer internship). We note that each theme requires an initial level of knowledge from previous disciplines; thus, the related disciplines are highlighted in each subject description. Vertical integration (sequential) examples might be: Biochemistry - Cardiology (Lipoprotein Metabolism / Dyslipidemias, Atherosclerosis); Physiology - Physiopathology - Cardiology (Physiology of the heart: functional features of the myocardial conduction system, cardiac cycle dynamics / the physiopathology of coronary insufficiency / coronary insufficiency: clinical picture, diagnosis, treatment); Microbiology, Virology, Immunology with Infectious Diseases - Epidemiology (Principles of classification and nomenclature of microorganisms; Morphology, structure and physiology of bacteria and viruses / Diseases caused by bacteria and viruses: clinical picture, laboratory diagnosis, treatment principles / Epidemiological feature and prophylaxis of infectious diseases).

The modernization and updating of lectures / courses takes place systematically, where the teachers, responsible for each subject, apply the performances of the scientific researches in the general and professional training of the specialists. Increased attention is paid to the improvement of didactic methodology, which is achieved through the implementation of modern educational technologies: problem study (clinical case), interactive techniques, evidence-based medicine, modern information technologies, including virtual ones, etc. Teaching methods, based on modern learning principles, favor students' progress and ability to participate in medical research, but also personal development as future specialists during the years of study.

The main stages of clinical case-centered teaching and learning are:

1. getting the initial information
2. generating an initial clinical hypothesis
3. highlighting additional data important to confirm the initial hypothesis
4. selecting laboratory tests and drawing up an investigation plan to specify the diagnosis
5. the formulation of a presumptive or definitive diagnosis
6. developing a treatment plan
7. the synthesis of the work done and the identification of the readings necessary for a better understanding of the problem presented.

Particular attention is paid to the acquiring and application of students' practical abilities.

As mentioned above, there is a separation between fundamental and specialized disciplines, and that is why the multidisciplinary course with PBL implementation involves the merging of several disciplines with impact in the study of neurosciences. The course is to be taught in the third year, the second semester. Finality - differentiated colloquium. The table below presents the academic curriculum for the third year, the Faculty of Public Health.

YEAR III

Nr.d /o	Disciplines	Semester V (17 weeks, 85 days)							Semester VI (17 weeks, 85 days)							Total credits	Total per year of study
		Total number of hours	Lectures	Practical works	Evaluation form				Total number of hours	Lectures	Practical works	Evaluation form					
					Examination	Differentiated	Colloquium	Total credits				Examination	Differentiated	Colloquium	Total credits		
1.	Physiopathology	85	34	51	●			6								6	85
2.	Morphopathology	85	34	51	●			6								6	85
3.	Internal diseases - Semiology	102	34	68			●	5	102	34	68	●			6	11	204
4.	Surgical diseases - Semiology	102	34	68			●	5	102	34	68	●			6	11	204
5.	Biostatistics and research methods	85	35	51	●			4								4	85
6.	Sanitary-hygienic insurance in exceptional situations	68	17	51		●		4								4	68
7.	Traumatology and orthopedics								85	34	51		●		4	4	85
8.	**NEUROSCIENCE**								**68**	**17**	**34**		**●**		**4**	**4**	**68**
9.	Sanitary microbiology								85	34	68	●			5	5	85
10.	Internship *								120		120	●			5	5	120
Total per semester		527	188	340	3	1	2	30	545	153	392	4	2	-	30	60	1072
Total per year of study		1072	341	732	7	3	2	60									

In order to achieve the proposed concept of the pilot project, the Neurology course, taught in the 5th year, will be replaced by the interdisciplinary course of Neuroscience in the third year. The content of the course will be adapted to the PBL concept for all integrated disciplines, starting with the identification of competencies, developing a clear methodology for formulating the clinical problem and ensuring group work guidance, formulating evaluation methods.

Curriculum content is not only informative but also formative, including a set of knowledge and skills - general and specific competencies, in order to train students in accordance with the medical learning outcomes and current and future requirements of society. At present, clinical skills

include anamnesis, clinical examination, procedures and investigations, action in case of emergency, first aid maneuvers, and communication with the patient.

3.3 DESCRIPTION OF THE PROGRAMME

Training is carried out on the basis of continuously improving study programmes in the tendency to align with international standards. In the training process, various interactive teaching methods, clinical case analysis, working directly at the patient's bed, evidence-based medicine, virtual programmes, etc. are applied.

Strategies and methods have a normative character and purpose to structure and model the learning process by making it dynamic, connected, tailored to the individual requirements of the student, involving both training and self-training, are innovative, centered on cognitivity, action, affective-attitudinal, inductive, deductive, analogous, mixed, algorithmic, and creative. Methods of stimulating the teaching process are at the basis of training and contribute to educating creativity, understanding the meaning of existing potential values. Analogue method, parabola, comparison, language, template breakage, brainstorming method as the most popular in recent years are used, original ideas being selected and subject to the attention of all participants in the discussion.

Courses, always updated and upgraded, are accompanied by clinical cases on the respective subject for a more efficient assimilation and memorization of the studied material. New methods of training are favored by the application of the algorithm principle in presenting the material, the assumption of tutelage responsibility of students in the argumentation of the diagnosis, the elaboration of the treatment and recovery plan of the patient, and the methods of prophylaxis of the diseases.

Particular importance is given to the acquisition of practical skills by students both during the module and during clinical internships.

In clinics, students attend morning conferences, weekly visits, presentation and discussion of seriously ill patients and patients presented for clinical conferences; they also attent at scientific conferences; anatomical and morphological; round tables with the participation of specialists from the Republic of Moldova and abroad to improve knowledge and practical skills in the diagnosis, treatment and prophylaxis of the diseases, as well as their optimization at the international level. Students are involved in the presentation of clinical cases or theoretical subjects at these manifestations.

The educational plan includes for each discipline a number of hours for individual study, so that the student becomes aware of the individual learning process, has the opportunity to prepare for his / her professional career and for lifelong learning.

The content of the study process is determined by:

- National Qualifications Framework on Professional Training Areas
- The educational plan
- The curriculum (analytical programmes) per course units.

The teaching-learning-evaluation process is carried out according to the **Educational plan** elaborated on the basis of the National Qualifications Framework and the Curriculum, which

includes: the disciplines ordered sequentially during the schooling, the discipline code, the degree of compulsoriness (compulsory or optional), its formative category (fundamental; training of general skills and competences; socio-humanistic orientation; specialization orientation); the number of hours allocated to each discipline (course, seminars, practical works, individual work), the number of credits allocated to the discipline and the form of evaluation.

The study programme at the Public Health specialty is conducted for 6 years. Each academic year consists of 2 semesters of 17 weeks (except for semester XII - 14 weeks), plus the examination sessions. Studies can only be organized full-time.

Of the 95 disciplines included in the educational plan:

- 74 are compulsory disciplines (77.89%);
- 21 are optional disciplines (22.11%).

The share in the educational plan of:

- fundamental disciplines is 25.4%
- specialized disciplines is 68.6%
- complementary disciplines is 6.2%.

The ratio between lectures and applicative activities (practical works, seminars, clinical internships) is 1: 2.69 (1936 course hours and 3675 hours of internships / practical works), the total being 7156 hours in 6 years.

- the share of internships in the educational plan - 9.12%.

The multidisciplinary course “Neuroscience” with PBL implementation is a combination of fundamental and compulsory specialty and project modules. The duration of the course is 1 semester (17 weeks), includes 68 academic hours of direct contact, finishing with the assessment - differentiated colloquium, and is allocated 4 transferable credits.

3.3.1 Curriculum on disciplines

In the SUMPh, the systematic process approach to curricular monitoring is applied by developing, implementing and improving the effectiveness of the Quality Management System in order to fully meet the needs of the beneficiaries by identifying and fulfilling their requirements and expectations. Thus, there is an evaluation system of the programme that monitors curricula and students’ progress and allows identification and correction of problems.

The process approach involves a permanent control over each process and of the interaction between processes based on the international standard ISO 9001-2008 implemented in the SUMPh since 2009. By implementing the standard ISO 9001: 2008, the SUMPh proves that:

- The Quality Management System is implemented in accordance with the requirements of this standard, is documented, maintained and continuously improved;
- Ensures compliance with quality policy;
- It consistently provides services that meet the requirements of the beneficiaries, as well as the regulations in force.

For continuous improvement, the Plan-Do-Check-Act model is applied in each process. Thus, the SUMPh plans and implements monitoring, measurement, analysis and improvement processes:

- to demonstrate compliance of the services with the established requirements;
- to ensure the compliance of the Quality Management System;
- to continuously improve system efficiency.

Curriculum monitoring programme of processes and results is ensured by applying the procedures of: *evaluating the beneficiary's satisfaction, assessing the quality of teaching* and *assessing the satisfaction of the teaching staff,* including all the elements necessary to meet the established requirements. The nominated procedures use the tools:

- CSB 8.2.1 / 1 Questionnaire for the evaluation of the satisfaction of the beneficiary, consisting of 20 items (Annex 7.1)
- CSP 8.2.1 / 1 Questionnaire for the evaluation of the quality of teaching, consisting of 19 items (Annex 7.2)
- CCD 8.2.1 / 2 Questionnaire for the evaluation of the satisfaction of the teaching staff, consisting of 23 items (Annex 7.3)

The process of evaluating the quality of teaching, the satisfaction of beneficiaries and teaching staff is carried out throughout the entire academic year through questionnaires evaluating their satisfaction with the delivered services / conditions created by the SUMPh.

The curriculum content (the analytical programme) is proposed by disiciplines, being examined and endorsed by the relevant Methodological Councils, the Curriculum Committee, and the Councils of the Faculties, which submit it for approval to the Scientific Council of the University within the general educational plan. Subsequently, the educational plan is approved annually by the Senate of the University.

Curricular content is reviewed periodically, emphasizing the pragmatic nature of medical education in line with the needs of the market. In the review and adaptation of the curriculum of the Faculty of Medicine, several decision-makers are involved in all study programmes: the dean and the vice-deans, the faculty council, the curriculum committee, the students' representatives (also part of the faculty council and the curriculum committee), representatives of the Students and Residents Association, representatives of the Union/Sindicate of SUMPh "Nicolae Testemitanu" collaborators.

Educational resources are allocated as needed, their analysis being made at the University's Scientific Council and the Board of Administration separately for each faculty study programme. Allocation of resources is based on the share of educational activities carried out by each discipline, both at the Bachelor's degree level and at the residency level.

The curriculum of the discipline has the following structure:

- ***Preliminaries*** (brief presentation of the purpose of the discipline);
- ***Administration of the discipline***, (description of assignment of topics and number of hours);
- ***Competencies*** obtained by the student through the study of the discipline;

- ***General / standard objectives of the discipline;***
- ***Reference objectives and content;***
- ***Suggestions for organizing individual work;***
- ***Selective bibliography;***
- ***Discipline evaluation;***
- ***Suggestions for individual work.***

The interdisciplinary course is proposed in the form below:

Discipline	Course	CLINICAL CASE
ANATOMY	Integrative anatomical details of the component parts of the central and peripheral nervous system.	**Cranio-cerebral trauma**
HISTOLOGY	Neuroembriology: morphogenesis.	**Arnold-Chiari**
	Neuroembriology: histogenesis.	
BIOCHEMISTRY	Nervous system metabolism.	**Parkinson's desease**
ANATOMY	Functional anatomy of the nervous system. Sensitivity. Motility: pyramidal pathway and extrapyramidal system.	**Multiple sclerosis**
IMAGING	Imaging anatomy of the nervous system.	**Subarachnoid haemorrhage**
PHYSIOLOGY	Brain mechanisms to control motivation and behavior. Thinking, learning and memory.	
PATHOLOGICAL PHYSIOLOGY	Pathophysiology of memory disorders and cognitive function. Physiopathology of cerebral ischemia.	**Alzheimer's desease**
MORPHOPATHOLOGY	Morphopathology of strokes, CNS neoplasias and neurodegenerative diseases.	**Cerebral tumor**
NEUROLOGY	Stroke: risk factors, clinical manifestations, diagnosis, emergency treatment.	
	Semiology of cerebral cortex damage. The facial nerve system. Central mimic paresis and peripheral mimic paresis. Diagnosis of localization of facial nerve affections. Principles of treatment.	**Facial neuritis**
PSYCHIATRY	Sleep, instinctuality, affectivity, knowledge and motivation: the neurobiological substrate and the associated psychiatric disorders.	

NEUROSCIENCE
HUMAN ANATOMY DISCIPLINE

Items	Requirements
Title of the lecture	**MORPHOLOGY OF THE NERVOUS SYSTEM**
Objectives	Integrative study and understanding of the morpho-functional features of the nervous system and the use of this knowledge in the acquisition of fundamental and clinical disciplines, to prevent various diseases, for the correct diagnosis and treatment. Anatomy is the science of living forms, transformations and reorganizations of the human body; it includes a systematization and integration of knowledge about the connection and the mutual influence of the somatic and visceral systems; about the influence of various factors of the external environment on the activity of the viscera and the central nervous system. Solid interdisciplinary knowledge is required for the good understanding and learning of the discipline.
Theme proposed	**General notions** **Classification of the nervous system** • Topographic principle (central and peripheral); • Functional principle (somatic and vegetative). **Central nervous system** **The general structure** (primary and secondary cerebral vesicles, their derivatives, the encephalum overview, components, origin, organization). **Spinal cord** - Functional anatomy, limits, dimensions, topography, **external conformation** (intumescent, ditches, terminal fillet) and **internal structure** (gray and white matter). The segmental structure of the spinal cord. **Brainstem**, its components. **External conformation and internal structure -** limits, external conformation, internal structure (the gray and white matter) of the brain (sagittal, transverse, frontal sections): the spinal bulb; Deck. Rhomboid fossa. The romancefalic Isthmus; Cerebellum; Mesencephalon. Reticular formation; Diencephalon. Pituitary port system; Telencefalo. The limbic system. **Brain shells** (cerebral and spinal cord meninges) and its derivatives. **Ventricular system of the encephalus** (ventricles IV, III, lateral - topography, walls, communications). **Circulation of the cerebrospinal fluid.** **Blood vascularization, venous and lymphatic drainage of CNS**. **The peripheral nervous system** **Cranial nerves (I-XII)** [nuclei projected into the rhombic fossa, fibral component, topography, trejectory, branches, interconnections, somatic (dermatomes, myotomes) and vegetative innervation areas]: **Spinal nerves** (general structure). Dorsal and ventral branches. Plexors, interconnections, somatic (dermatomes, myotomes) and vegetative innervation areas.

Bibliography	1. Stefanet M. Anatomia Omului. Vol. II. Chişinău: CE-P Medicina, 2013, 432 p. 2. Stefanet M. Anatomia Omului. Vol. III. Chişinău: Sirius SRL, 2013, 428 p. 3. Sinelnicov R.D., Sinelnicov Ia. R. Атласанатомиичеловека I, II, III и IV (oricare ed.). 4. Catereniuc I., Lupaşcu T., Babuci A. et al. Culegere de scheme la anatomia omului / Сборниксхемпоанатомиичеловека / Collection of schemes for humananatomy. Ed. a III-a (revăzută şi completată). Chişinău, 2012 5. Drake R.L., Vogl W.et al. Gray'sAnatomy for students. Philadelphia… Toronto, 2005. 6. Drake R. L., Vogl W., Mitchell A. W. M., Tibbitts R. M., Richardson P. E. Gray's Atlas of Anatomy. Elsevier, 2008. 7. Kahle W., Frotscher M. Color Atlas of HumanAnatomy, vol. III, NervousSystemandSensoryOrgans. Stuttgart-New Jork, 2003. 8. Netter F. H. Atlas of HumanAnatomy. Elsevier, 2006. 9. Лобко П. И., Мельман Е. П., Денисов С. Д., Пивченко П. Г. Вегетативная нервная система. Атлас. Минск, 1988.
Professional skills	**Students shall**: 1. know the structure of NS formations at macro- and microscopic level, their function, their topography etc. 2. appreciate the importance of knowledge in the field of human anatomy for the acquisition of fundamental and clinical medical disciplines; 3. become aware of the applicability of anatomical knowledge regarding the diagnosis and treatment of diseases.
Teaching methods and course materials	Courses will be done through videoprojections. PowerPoint and Smart Notebook course support.
Teaching methods and materials for practical works	Practical works will be performed in the department's laboratories (dissection room). Presentations will be done in PowerPoint and Smart Notebook. In order to ensure a high degree of interactivity, the interactive Smartboard will be used to defend the group work. During the practical works there will be studied the pre-prepared anatomical parts, will be used drawings/pictures, casts, tables, and the exhibits from the Anatomic Museum will be studied.

Items	Requirements
Title of the lecture	**MORPHOFUNCTIONAL PARTICULARITIES OF THE NERVOUS SYSTEM. VEGETATIVE NERVOUS SYSTEM - GENERALITIES.**
Objectives	Integrative study and understanding of morpho-functional features of the nervous system and use of this knowledge in the acquisition of fundamental and

	clinical disciplines, for the prevention of various diseases, diagnosis and correct treatment. Anatomia este ştiinţa formelor vii, a transformărilor şi reorganizărilor corpului omenesc, ea include o sistematizare şi integrare a cunoştinţelor despre conexiunea şiinfluenţa reciprocă a sistemelor somatice şi viscere; despre influenţa diferitor factori ai mediului extern asupra activităţii viscerelor şi sistemului nervos central. Anatomy is the science of living forms, transformations and reorganizations of the human body; it includes a systematization and integration of knowledge about the connection and the mutual influence of the somatic and visceral systems; about the influence of various factors of the external environment on the activity of the viscera and the central nervous system. Solid interdisciplinary knowledge is required for the good understanding and learning of the discipline.
Theme proposed	**Morphological support of the reflex arc.** The reflex arc as the basic morpho-functional unit of the nervous system (simple-compound, somatic-vegetative). The related and interleaving components of the reflex arc. Synapse. **The relative** (sensitive) **link** of the reflex arc. Sensitive analyzer. Definition and classification of analyzers. Sensory organs [skin analyzer (nociceptive, thermal, tactile, vibrational sensitivity); visual analyzer (NC II); acoustic analyzer (NC VIII); vestibular analyzer (NC VIII); olfactory analyzer (NC I); the tasting analyzer; proprioceptive analyzer; visceral analyzer]. **The relative** (motor) **link** of the reflex arc. Motor analyzer. The mion - the neuro-motor unit. **Somatic motor analyzer** (somatic and branhial). The pyramidal system (cortico-nuclear tract, lateral and anterior cortico-spinal). Extrapyramidal system (cortico-ponto-cerebelo-rubro-spinal tract, etc.). Complex (praxis) motility. Signaling systems I and II. Motility of eyeballs (cranial nerves III, IV and VI). **Visceral motor analyzer** (vegetative). **VEGETATIVE NERVOUS SYSTEM - generalities.** **Sympathetic and parasympathetic nervous system - central and peripheral portions.** ✓ The vegetative nervous system - structural and functional particularities. Reflex arc at the vegetative nervous system. ✓ The components of the vegetative nervous system. The centers of the vegetative nervous system, its peripheral portion. ✓ Vegetative nervous fibers - origin, types, structural and histochemical features, distribution paths, terminations. ✓ The sympathetic part of the vegetative nervous system, central and peripheral formations. Sympathetic chain - general structure, topography, segments, ganglia, types of branches.

	✓ Parasympathetic portion of the vegetative nervous system, central and peripheral formations. ✓ General notions about **metasimpatic** system and **nonadrenergic**, **noncolinergic** nerve fibers. ***Sympathetic*** **vegetative ganglia** (paravertebral (sympathetic chain) and prevertebral) and parasympathetic (paraorganic and intra-organic / intramural). Ciliary, pterigopalatin, submandibular, sublingual and otic ganglion - localization, external conformation, structure, connections, branches, innervation areas. **Innervation of the viscera** (nerve sources, fibrillar structure, inra -and periorganic visceral plexus). The general characteristic of the vegetative nervous plexus in the thoracic, abdominal and pelvis cavity, the peculiarities of their distribution in the parenchymal and cavitary organs (vegetative plexus in the thoracic, abdominal, pelvis cavities - formation, distribution, innervation areas. Innervation of the abdominal and pelvic viscera).
Bibliography	1. Stefanet M. Anatomia Omului. Vol. II. Chişinău: CE-P Medicina, 2013, 432 p. 2. Stefanet M. Anatomia Omului. Vol. III. Chişinău: Sirius SRL, 2013, 428 p. 3. Sinelnicov R.D., Sinelnicov Ia. R. Атласанатомиичеловека I, II, III и IV (oricare ed.). 4. Catereniuc I., Lupaşcu T., Babuci A. et al. Culegere de scheme la anatomia omului / Сборниксхемпоанатомиичеловека / Collection of schemes for humananatomy. Ed. a III-a (revăzută şi completată). Chişinău, 2012 5. Drake R.L., Vogl W. et al. Gray·sAnatomy for students. Philadelphia…Toronto, 2005. 6. Drake R. L., Vogl W., Mitchell A. W. M., Tibbitts R. M., Richardson P. E. Gray·s Atlas of Anatomy. Elsevier, 2008. 7. Kahle W., Frotscher M. Color Atlas of HumanAnatomy, vol. III, NervousSystemandSensoryOrgans. Stuttgart-New Jork, 2003. 8. Netter F. H. Atlas of HumanAnatomy. Elsevier, 2006. 9. Лобко П. И., Мельман Е. П., Денисов С. Д., Пивченко П. Г. Вегетативнаянервнаясистема. Атлас. Минск, 1988.
Professional skills	**Students / residents shall:** 1. know the structure of NS formations at macro- and microscopic level, their function, their topography etc. 2. appreciate the importance of knowledge in the field of human anatomy for the acquisition of fundamental and clinical medical disciplines; 3. become aware of the applicability of anatomical knowledge regarding the diagnosis and treatment of diseases.
Teaching methods and course materials	Courses will be done through videoprojections. PowerPoint and Smart Notebook course support.

Teaching methods and materials for practical works	Practical works will be performed in the department's laboratories (dissection room). Presentations will be done in PowerPoint and Smart Notebook. In order to ensure a high degree of interactivity, the interactive Smartboard will be used to defend the group work. During the practical works there will be studied the pre-prepared anatomical parts, will be used drawings/pictures, casts, tables, and the exhibits from the Anatomic Museum will be studied.

NEUROSCIENCE COURSE - DISCIPLINE OF HISTOLOGY

Items	Requirements
Title of the lecture	**Neuronal Embryology**
Objectives	The integrative understanding of a science situated in the convergence of various domains ranging from molecular structure to complex cerebral cognitive functions, the basis of human behavior and evolution.
Theme proposed	1. Aspects of neuronal development. ✓ Neural induction. ✓ Regionalization. ✓ Neural tube formation. ➢ Dorsoventral shaft. ➢ Rostrocaudal shaft (anteroposterior). 2. Early / late neuritis. ✓ Neural migration. ✓ Radial migration. ✓ Tangential migration. ✓ Axophilic migration. 3. Migration of neural crest cells. 4. Neural migration in the central nervous system (cortical histogenesis). 5. Neural determination. 6. The origin and generation of neural progenitor cells. 7. Neurons and glia of the central nervous system. 8. Sensory neurons of the peripheral nervous system. 9. The formation of synaptic connections in the central and peripheral nervous system. 10. Neurotropic factors and apoptosis.
Bibliography	1. Gusac P, Embriologie umană. Lucrări practice pentru studenţii în medicină. Chişinău, SUMPH "Nicolae Testemiţanu", 2000. 2. Miu AC, Olteanu AI, Neurostiinte - de la mecanisme moleculare si celulare la comportament si evolutie (vol. 1 Dezvoltarea sistemului nervos), Ed. Dacia, Bucuresti, 2002.

	3. Sadler TW, Langman's medical embryology. LippincottWilliams&Wilkins, 2004. 4. Larry Squire, Darwin Berg, Floyd Bloom, Sascha du Lac, AnirvanGhosh, Nicholas Spitzer, FUNDAMENTAL NEUROSCIENCE, thirdedition, 2008
Professional skills	1. detailed understanding of central and peripheral nervous system development processes (normal and pathological conditions) 2. realizing the foundations on which neuroscience is based
Teaching methods and course materials	Courses will be done through videoprojectionss. PowerPoint and Smart Notebook course support.
Teaching methods and materials for practical works	Practical works will be done in the department's laboratories (room for practical works, histological laboratory, and immunohistochemical laboratory), using optical microscopes, and histological blades. Presentations will be done in PowerPoint and Smart Notebook. In order to ensure a high degree of interactivity, the Interactive Smartboard will be used for the defence of the group work.

Items	Requirements
Title of the lecture	**Neuronal morphology**
Objectives	The integrative understanding of a science located at the convergence of various domains ranging from molecular structure to complex cerebral cognitive functions, the basis of human behavior and evolution.
Theme proposed	1. Structure of the neuron (cell body, dendrite, axon). 2. Classification of neurons. 3. Glial cells (macroglia, microglia) 4. Myelin sheath (amylinic and myelin nerve fibers). - The process of myelination in the central nervous system and the peripheral nervous system. 5. Neuronal degeneration and regeneration. 6. Receptors. Inter-neuronal synapse and effector synapse. 7. Histology of the central nervous system (spinal cord, brainstem, encephalus, cerebellum) and peripheral nervous system. 8. Brain membranes (brain and spinal cord).
Bibliography	1. Larry Squire, Darwin Berg, Floyd Bloom, Sascha du Lac, AnirvanGhosh, Nicholas Spitzer, FUNDAMENTAL NEUROSCIENCE, thirdedition, 2008 2. Dale Purves, George J. Augustine, David Fitzpatrick, William C. Hall, Anthony-Samuel Lamantia, James O. Mcnamara, S. Mark Williams. NEUROSCIENCE, thirdedition, Publishers Sunderland, Massachusetts U.S.A, 2004 3. Miu AC, Olteanu AI, Neurostiinte - de la mecanisme moleculare si celulare la comportament si evolutie, Ed. Dacia, Bucuresti, 2002.

Professional skills	1. the detailed understanding of the microscopic structure of the nervous tissue, with the emphasis on structural particularities for the central and peripheral nervous system. 2. drawing the fundamental links with the physiology and pathology of the nervous system.
Teaching methods and materials	Courses will be done through videoprojections. PowerPoint and Smart Notebook course support.
Teaching methods and materials for practical works	Practical works will be done in the department's laboratories (room for practical works, histological laboratory, and immunohistochemical laboratory), using optical microscopes, and histological blades. Presentations will be done in PowerPoint and Smart Notebook. In order to ensure a high degree of interactivity, the Interactive Smartboard will be used for the defence of the group work.

NEUROSCIENCE COURSE - BIOCHEMISTRY DISCIPLINE

Items	Requirements
Title of the lecture	**Neurochemistry**
Objectives	Knowledge of the structural and metabolic peculiarities of the nervous system functionality; understanding the molecular mechanisms of nervous system diseases.
Theme proposed	1. Particularities of chemical composition of nervous system cells. 2. Membrane transport. Blood-brain barrier - biochemical aspects. 3. Particularities of energetic, glucidic, lipid and protein metabolism in nervous cells. 4. Nervous transmission and cellular signaling. a) Presynaptic phenomena (biosynthesis of mediator substances, storage, release of synaptic mediator, recapture). b) Postsynaptic phenomena (synaptic receptors, recognition and fixation of the neurotransmitter on the receptor, transduction of synaptic signals, post-synaptic electrochemical manifestations). 5. Synaptic chemical mediation. a) Cholinergic mediation. Acetylcholine. b) Monoamineergic mediation (catecholamines, serotonin, histamine). c) Aminoacidergic mediation. d) Purineergic signaling. e) Opioid and non-opioid peptides.
The title of the practical work	**Biochemical aspects of some pathologies of the nervous system - 3h.**
Theme proposed	1. Biochemical aspects in Parkinson's dDisease. Neurobiology of Alzheimer's disease. 2. Ischemia and reperfusion of the brain: the cellular and molecular mechanisms of stroke. Apoptosis and necrosis. 3. Neurochemistry of some normal psychiatric processes (memory, learning) and mental disorders (schizophrenia, autism, depression, anxiety)

Bibliography	1. Scott T. Brady. Giorge J. Siegel. Basic neurochemistry. Principle of molecular, cellularand medical neurobiology. American Society of Neurochemistry. Elsevier inc. 2012. 2. Haulică I., Dobrescu G. Transmiterea sinaptică. Repere structurale și funcționale. București, 1999.
Professional skills	1. Understanding the molecular mechanisms of the processes underlying the functioning of the nervous system; 2. Acquiring the relationships between chemical processes and achieving synaptic transmission and intracellular transduction of the mediator signal. 3. Knowledge of the biochemical aspects of the nervous system pathology.
Teaching methods and course materials	Courses will be done through videoprojectionss. The course support will be done in PowerPoint.
Teaching methods and materials for practical works	Practical works will be conducted in the department's laboratories. Presentations will be made in PowerPoint. Situational problems and interactive teaching methods will be used.

NEUROSCIENCE COURSE – IMAGING DISCIPLINE

Name: **Imaging methods of the central nervous system.**

Neuroradiology:

- **Standard radiology**
- **Transcranian Doppler**
- **Computerized tomography**

a) Native sections in CT (5.0 mm)
b) 3D reconstructions (1.5 mm sections)
c) CT angiography

- **Magnetic resonance imaging**

a) Positioning sections in MRI
b) Thickness of sections in MRI
c) The fundamental sequences used in MRI

- The sequence T1
- The sequence T2
- Magnetic resonance angiography

Strokes

- **MRI protocol in case of suspected stroke**
- **Ischemic arterial stroke**

- Acute phase:

* CT
* Angio-CT
* IRM

* Angio-IRM

- Subacute and chronic phase

  * CT
  * IRM

- Ethylogy of ischemic artery stroke

– **Venous ischemic stroke (cerebral venous thrombosis)**

- Cerebral venous thrombosis imaging.

  * CT
  * Angio-CT
  * IRM
  * Angio-IRM

DISCIPLINE MORPHOPATHOLOGY

THE COURSE PLAN

Pathology of SNC

- ***Cerebral edema, intracranial pressure, hernia, hydrocephalus.***
- ***Congenital malformations.***
- ***Cerebrovascular diseases.***
  - *Hypoxia, ischemia, heart attack.*
  - *Intracranial haemorrhage.*
  - *Hypertensive cerebrovascular disease.*
- ***Infections.***
  - *Acute meningitis.*
  - *Acute focal suppurative infections.*
  - *Chronic bacterial meningoencephalitis.*
  - *Viral meningoencephalitis.*
- ***Demyelinating diseases.***
  - *Multiple sclerosis.*
- ***Degenerative diseases.***
  - *Alzheimer's disease.*
  - *Parkinson's disease.*
- ***Tumors.***
  - *Gliomas.*
  - *Neuronal tumors.*
  - *Poorly differentiated neoplasms.*
  - *Meningiomas.*
  - *Metastatic tumors.*

NEUROSCIENCE COURSE - PSYCHIATRY DISCIPLINE

Items	Requirements
Title of the lecture	Introduction to psychiatry. Elements of psychiatric semiology. Neurotic and stress-related disorders. Somatoform disorders.
Objectives	• at the end of the course the students will have knowledge about psychiatry as medical specialty, classification elements of psychiatric pathology, semiotics relevant to neurotic pathology, biological substrate of neurotic pathology. • at the end of the course students will be initiated to distinguish neurosis from psychosis.
Theme proposed	• Introduction to psychiatry. o Psychiatry, psychiatric pathology, pejorative terms used in psychiatry, neurosis vs psychosis, elements of classification of mental disorders. • Elements of psychiatric semiology. o Disorders of perception, attention, memory, thinking, affection, will, neurobiological correlations. • Neurotic and stress-related disorders (F40-F48). o Classification, general characteristic of mentioned nosologic group according to CIM-10 criteria. • Somatoform disorders (F45). o General characteristics, neurobiological correlations, positive and differential diagnostic criteria, principles of treatment. • Psychosomatic elements. o Pathogenesis, respiratory and cardiovascular system.
Bibliography	1. Cornuțiu G., Breviar de psihiatrie, Editura Universității din Oradea, 2008. 2. Kaplan &Sadock's Comprehensive Textbook of Psychiatry, 9th Edition, Lippincott Williams &Wilkins, 2009. 3. Prelipceanu D., Psihiatrie clinică. Editura Medicală, București, 2013. 4. Sadock Benjamin J., Manual de buzunar de psihiatrie clinică, Editura medicală, 2001.
Professional skills	• The ability to distinguish neurosis from psychosis, to appreciate neurotic symptoms, to assess somatoform disorder, and to consider psychosomatic etiopathogenesis in explaining some therapeutic diagnoses.
Teaching methods and course materials	• Courses will be carried out through: computer with reading system of PowerPoint documents, image projection system (VGA-HDMI compatible projector), screen, pointer, study room. Course support done in PowerPoint and PDF document previously provided before the course.
Teaching methods and materials for practical works	• Practical works will be carried out within the Psychiatric Clinical Hospital (room for practical works, clinical departments). Presentations will be done in PowerPoint. In order to ensure a high degree of interactivity, clinical cases with differential diagnosis will be used to defend the group work.

NEUROSCIENCE COURSE - NEUROLOGY DISCIPLINE

Items	Requirements
Title of the lecture	**Neurological examination**
Objectives	Acquiring the method of neurological clinical examination for the purpose of determining the location of the pathological process, assessing the functioning of the central and peripheral nervous system components, as well as the muscular system.
Theme proposed	1. The specific of the neurological examination. ✓ Does the lesion have a unique location? ✓ Does the lesion have more outbreaks? ✓ Does the lesion have a diffuse location? ➢ Central nervous system suffering. ➢ Peripheral nervous system suffering. 2. Neurological anamnestic. ✓ Analysis of the accuses. ✓ Evolution of the disease. ✓ Family anamnesis. ✓ Personal and social antecedents. ✓ Formulation of the general impression about the patient. 3. Examination of the cranial nerve function. 4. Examination of sensitivity. 5. Examination of motility. 6. Researching meningian signs. 7. Examination of vegetative nervous system function.
Bibliography	Gavriliuc M, Examenul Neurologic. Chişinău, „Tipografia-Sirius"; 2012. Gherman D, Moldovanu I, Zapuhlâh G. Neurologie şi Neurochirurgie. Manual. Chişinău: Centrul Editorial-Poligrafic Medicina; 2003. Hauser SL, Josephson SA. Harrison'sNeurology in Clinical Medicine. 2nd ed. New York: McGraw-Hill; 2010.
Professional skills	1. knowing the sequence of the neurological examination
Teaching methods and course materials	Courses will be done through videoprojectionss. PowerPoint course support.
Teaching methods and materials for practical works	Practical works will be done in the rooms for practical lessons of the neurology department, using the algic, thermal sensing devices, the cameron, the neurological hammer. There will be presented patients from the Neurological Clinic.
Items	**Requirements**
Title of the lecture	**Higher Cerebral Functions**

Objectives	Determining the patient's consciousness. Appreciation of cognitive functions of the patient, realization of differential diagnosis between disorders of higher cerebral functions and psychiatric pathology.
Theme proposed	1. Level of consciousness. 2. Cognitive functions - Orientation. - Attention. - Memory. - Calculation. - Speech. - Writing. - Reading - Praxis. - Gnosis. 3. Acute states of disorder and depression of consciousness. 4. Unconscious patient's examination.
Bibliography	1. Gavriliuc M, Examenul Neurologic. Chişinău, „Tipografia-Sirius"; 2012. 2. Gherman D, Moldovanu I, Zapuhlâh G. Neurologie şi Neurochirurgie. Manual. Chişinău: Centrul Editorial-Poligrafic Medicina; 2003. 3. Hauser SL, Josephson SA. Harrison'sNeurology in Clinical Medicine. 2nd ed. New York: McGraw-Hill; 2010.
Professional skills	1. knowing how to examine higher brain functions 2. unconscious patient's examination
Teaching methods and course materials	Courses will be done through videoprojections. PowerPoint course support.
Teaching methods and materials for practical works	Practical works will be done in the rooms for practical lessons of the neurology departement; patients with disorders of higher cerebral function will be presented and examined.