

**FACULTY STOMATOLOGY****STUDY PROGRAM IN 0911.1 STOMATOLOGY****DEPARTMENT OF HUMAN PHYSIOLOGY AND BIOPHYSICS****APPROVED**

at the meeting of the Committee for Quality Assurance and Evaluation of the Curriculum Stomatology Faculty

Protocol No. 3 from 16.07.2018

Chairman, PhD, associate prof.

Stepco Elena *E. Stepco*

APPROVED

at the Council meeting of the Stomatology Faculty

Protocol No. 6 from 20.02.2018

Dean PhD, associate prof.

Ciobanu Sergiu *S. Ciobanu*

**APPROVED**

at the meeting of the chair of Human Physiology and Biophysics

Protocol No.13 of 29.01.2018

Head of chair, PhD, professor

V. Vovc *V. Vovc*

CURRICULUM**DISCIPLINE HUMAN PHYSIOLOGY****Integrated studies**

Type of course: **compulsory discipline**

Chișinău, 2018

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I. PRELIMINARIES

- **General presentation of the discipline: the place and role of the discipline in the formation of the specific competences of the program of professional formation/specialty**

Physiology is the discipline that studies the functions of living organisms, organs and tissues and is based on the fundamental principle of functioning of the body as an integral whole. The course of physiology provides notions on the fundamental properties of living matter, in conjunction with its structural organization; the roles of macro and microelements in the human body. The course assures knowledge of the functions of the cardiovascular, respiratory, digestive, renal apparatuses as well as the mechanisms of regulation involved in adapting the functioning of these systems to different internal and external demands. Also, the study of the functions of the nervous and endocrine systems allows understanding how to integrate all physiological systems into the functioning of the body as a whole. The acquisition of physiology is necessary for the integration of functions at the molecular-cellular level at the tissue-organ level, to understand the functioning of the different organs, systems, and interactions between them. During the course of physiology, notions will be accumulated regarding the different categories of receptors, neuromediators, cytokines, for the modern foundation of the multiple physiological mechanisms.

The acquired concepts will provide a basis for any preventive, diagnostic, curative or recuperatory medical act.

- **The mission of syllabus (aim) in professional formation**

Human physiology aims to endow the student with fundamental data about the functional properties of cells, tissues, organs and systems, about their neuro-humoral mechanisms of regulation and control. The duration of this two-semester semester's study is covered by the multitude of scientific notions that need to be learned, and in order to better understand them, it is necessary to correlate with the medical practice and to learn the methods of evaluation of the organ function. These knowledge will be used for understanding the principles of functional malfunctions and their correlation mechanisms.

- **The teaching language/languages of the discipline:** english;
- **Beneficiaries:** students of the II year, Faculty of Stomatology

II. ADMINISTRATION OF THE DISCIPLINE

Code of the discipline	F.02.O.020		
Name of the discipline	Fiziologia omului		
Person in charge of the discipline	Ph. D., prof. Victor Vovc, O. Arnaut		
Year	I	Semestrer/Semesters	II
Total hours, including:			90
Lectures	17	Practical/laboratory lessons	17
Seminars	34	Individual work	22
Type of evaluation	C	Number of credits	3



III. TRAINING OBJECTIVES IN THE DISCIPLINE

In the end of the course student will be able to:

- **at the level of knowledge and understanding :**

- to accumulate the information about the normal function of human body, in the future enrich this knowledge with basic information from physiopathology, morph pathology and biochemistry;
- to know the physiological constants, variation of this constants in depends of age and in correlations with new evolution of biomedical sciences;
- to develop the ability for recording and reading the dates and to format private conclusions about individual or biological variation;
- to understood the importance of regulatory mechanisms of physiological functions, of organs and systems of organs for normal activity in human body.

- **at level of application:**

- to determine and to analyze the parameters of functional tests (electromyogram, auscultation of heart, recording blood pressure, electrocardiogram, electroencephalogram, spirometry, et all.);
- to determine basic metabolism by calorimetric methods ;
- to know the method of blood collection and speak about laboratory results;
- to know the method for appreciated activity of organs and system of organs by virtual or computerized thickness in BIOPAC system;
- to study the method of clinical problem.

- **at level of integration:**

- to appreciate the importance of physiology for general medicine and integration with medico-biological sciences;
- to appreciate the importance of studding the regulatory functions and control of organs and system of organs and interconnections between different system of organs;
- to use the acquired knowledge to understand the principles of functional malfunctions and their recovering mechanisms;
- to become aware of the need to continuously acquire new knowledge in the field.

IV. PREVIOUS CONDITIONS AND REQUIREMENTS

Physiology is the fundamental medico-biological science, study that s at the stage academic enable future doctors to study the physiological functions of human body. The theoretical and practical lessons include complex information about physiological mechanisms and begin by general physiology, functions of cell membrane, properties of different cells and tissues and continue by general mechanisms of control and regulation of system of organs.

This knowledge's form the basis for next steps witch include studding functions at the level of system of organs (cardiovascular, respiration), nervous and humoral answers in different external and internal conditions (modifications of atmospherically pressure, at all.)

For good assimilation of the discipline it is necessary to possess a sound knowledge in the field of Biology, Chemistry, Physics of the undergraduate studies obtained.



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V. THEMES AND DISTRIBUTION OF HOURS

Nr.	TEMA	Numărul de Ore			
		Lectures	Seminars	Practical lessons	Individual work
1.	Structure and function of Biological Cellular Membranes.	1	2	1	-
2.	Electrogenesis of excitation. Physiological properties of excitable tissues. The physiology of nervous fibers.	1	2	1	2
3.	Synapses and neuronal circuits. Inhibition in CNS. Types of inhibition	1	2	1	2
4.	Muscle physiology. Neromuscular junction. Mechanisms of Muscular contraction and relaxation. Peculiarities of smooth muscles.	1	2	1	1
5.	Concluding test: Physiology excitable tissues.	1	2	1	1
6.	Physiology of the heart. Properties and particularities of cardiac muscle. Clinical methods of assessment of heart activity.	1	2	1	2
7.	Physiology of blood vessels. Regulation of the Circulation.	1	2	1	2
8.	Heart sounds. Auscultation. ECG, interpretation	1	2	1	1
9.	The blood functions. RBC and WBC. Plasma. Hemoglobin. Blood types. Hemostasis and blood clotting.	1	2	1	2
10.	Concluding test: Cardiovascular system. Blood	1	2	1	1
11.	Excretion. Urine formation. Glomerular filtration. Body fluid compartments. Acid-base balance regulation	1	2	1	1
12.	Endocrine glands. Hormones, action mechanism. Physiology of Pituitary gland. Interaction between Hypothalamus and Pituitary gland.	1	2	1	1
13.	Physiology of endocrine glands (pancreas, thyroid, adrenal cortex, hormonal function of male and female)	1	2	1	2
14.	Autonomic nervous system and adrenal medulla.	1	2	1	1
15.	Concluding test. Fluids. Excretion. Endocrine glands. ANS	1	2	1	1
16.	Regulation of Food Intake. Energy metabolism. Calorimetry Thermoregulation. Computer-based test.	1	2	1	1
17.	Colocvium General Physiology. Computer-based test. Recovery	1	2	1	1
		17	34	17	22
TOTAL:		90			

**VI. REFERENCE OBJECTIVES AND CONTENTS UNITS**

Objectives	Content units
Theme (chapter) 1. PHYSIOLOGY OF EXCITABLE TISSUES	
<ul style="list-style-type: none">• Define the notion of excitable tissue, transmembrane transport, electrochemical gradient, transmembrane potential for rest and action, refractivity.• to know the structure and functional aspects of biological membranes, neurons, nerve fibers of skeletal and smooth muscle fibers such as receptor sicle, neuromediators.• demonstrate the mechanism of generating and propagating the potential of action through nerve fibers, muscle contraction and relaxation, synapse functionality.• apply excitability laws to the functioning of excitable tissues• integrate knowledge about the structural aspects and functioning of excitable tissues in the body's integral functioning.	<ol style="list-style-type: none">1 Structure and function of biological membranes.2 Electrogenesis of the excitation process.3. Physiological properties of excitable tissues.4. Peripheral nerve properties.5. Synapse in CNS6. Central nervous system inhibition. Types of inhibition.7. Structure and Function of neuronuscular junction.8. Physiological properties of striated and smooth muscles.
Theme (chapter) 2. CARDIOVASCULAR SYSTEM. BLOOD.	
<ul style="list-style-type: none">• Define the notion of cardiac pump, microcirculation, blood pressure, vascular resistance, colloid osmotic pressure, hematopoiesis• to know the pulmonary and systemic circulation, the structure of cardiomyocytes, the laws of hemodynamics, the cardiac nerves, the structure and function of the cardiovascular center, the clinical aspect of the haemodynamic system constants, the figurative elements of the blood, the blood groups, the coagulant-anticoagulant system• demonstrating SNV and hormones in extrinsic heart rate regulation mechanisms and blood pressure maintenance mechanisms, the role of coagulant-anticoagulant system in maintaining the whole body homeostasis• apply the knowledge gained in blood pressure measurement, heart auscultation, electrocardiogram recording and analysis, coagulant-anticoagulant and immunological status• integrate the knowledge gained to explain and formulate conclusions about cardiovascular pathologies, to interpret the results of laboratory blood samples	<p>Heart pump. Dynamics of the heart cycle. The physiological properties of the heart muscle. Exodus-conductive myocardial system. Adjusting heart activity. Nervous and humoral influence on cardiac activity. Liquid exchanges in the capillaries. Control of local blood flow through tissues. Blood circulation regulation mechanisms. Blood pressure, adjustment mechanisms. Electrocardiography. Heart sounds. Blood plasma composition constant. Erythrocytes, hemoglobin Leukocytes immunity. Blood groups, Rh factor. Vasotrombocytary and haemocoagulant mechanism of haemostasis. The anticoagulant system. Metabolism of microelements, regulation</p>
Theme (chapter) 3. FLUIDS. EXCRETION. ENDOCRINE GLANDS. ANS	

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Objectives	Content units
<ul style="list-style-type: none">• Define the notion of internal secretion, hormone, receptor, autonomic nervous system, osmolarity, volum, diuresis• to know the chemical structure of hormones, the localization in CNS of pre- and post-ganglion neurons, neuromediators and receptors of the vegetative nervous system, the structure of the nephron, the mechanism of urine formation: filtration, reabsorption and tubular secretion• demonstrate the role of mediators and receptor systems in regulating the activity of different organs and systems, the countercurrent multiplication phenomenon, information of the final urine, the role of volition and pressional diuresis in the regulation of arterial pressure.• apply neuro-moral regulation mechanisms to control the activity of different systems and to maintain the body's homeostasis, in determining the total volume of water, intra- and extracellular volumes, urine clearance, blood groups and Rh, in explaining the blood transf• integrate knowledge about neuro-moral and drug regulation in regulating the activity of different organs and systems, to interpret the results of laboratory urine samples	<p>Glands with internal secretion. Hormones, classification mechanism of action. The hypothalamic-pituitary system. Adeno- and neurocytophobia, tropon hormones. Pancreas, thyroid, parathyroid, sexual glands Primary urine formation - glomerular filtration Reabsorption and tubular secretion - final urine formation. Urine flow, diuretic regulation Volum, regulation of normovolemia Intraceutic and extracellular fluid, composition. Adjustment of intake and removal of water from the body Overdosage, hormonal mechanisms of function regulation. Local Hormones. The nervous system, vegetative nerves, neurons, sympathetic and parasympathetic. Mediators. sympathetic and parasympathetic system. Adreno- and colinoreceptors of sympathetic and parasympathetic system Effects of the sympathetic and parasimpatic system on different systems.</p>

VII. PROFESSIONAL COMPETENCES (CY) AND TRANSVERSAL (CT) COMPETENCES AND FINALITIES OF STUDY**✓ Professional competences (Specific) (CS)**

- CP1. - Identify anatomical structures and explain the development of physiological processes and phenomena in the human body. It possesses both knowledge and a broad understanding of different physiological aspects, in order to have the opportunity to develop a wide range of attributes, including those of research, investigating, analyzing, as well as being able to confront and solve some problems, plan communications, and present team spirit.
- CP2. - Possess knowledge about the choice of type of analysis and methods of clinical, paraclinical and instrumental investigation for correct and targeted assessment of physiological functions; Understand the importance of the correct interpretation of the results obtained in the assessment of the functional state of the organs and systems in the context of a doctor-specialist pharmacist-specialist cooperation.

✓ Finalities of the course

Education of the students in the spirit of the rigor of the medical act and understanding the determinant role of the fundamental sciences for the given level, as well as for their professional training.

Students acquire practical skills in the correct execution of functional explorations, based on the understanding of not only the procedures but also the phenomena explored, as well as the principles of the respective techniques;



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Explaining some theoretical notions by presenting some classical experiments in practical and laboratory works;

Students' theoretical training to assimilate knowledge through systematized information on functional integration phenomena from cell to organ, organ systems and body as a whole

All of these will allow students to acquire knowledge about the normal functions of the human body, so they will be able to integrate the physiological processes from cell to body in an integrative manner, thus gaining a solid foundation for clinical medical sciences.

Note. The finalities of the discipline (deduced from the professional competencies and formative valences of the informational content of the discipline).

VIII. INDIVIDUAL WORK OF THE STUDENTS

Nr.	Supposed result	Strategies of execution	Criteria of evaluation	Term of execution
1.	Completing the notebook of practical works:	Carry out the tasks displayed in the notebook using the Phi.I.L.S physics laboratory simulation program. 4.0 Physiology Interactive Lab Simulations PhysioEx 9.0 Physiology Laboratory Simulation Program (Laboratory Simulations in Physiology); and Virtual Physiology Software in which viewing films can be viewed with physiological experiences or clinical investigation methods; Fill in the laboratory work card Make conclusions at the end of each paper.	the ability to formulate the conclusions, the correctness of completing the work record in the laboratory.	During semester
2.	Presentations, posters and essays.	Analysis of the specialized literature, selection of the research theme, establishment of the work plan and deadline. Approval of the PowerPoint PowerPoint presentation components, poster or report - topic, topicality, purpose, results, conclusions, practical applications, bibliography.	Level of knowledge and understanding of the project theme, scientific argumentation and data presentation, quality of conclusions, creativity elements, personal attitude formation, coherence of exposure and scientific correctness, graphic presentation.	Till the end of the semester



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3.	Methods and strategies of learning	Try to understand the key notions, argue each information through examples, form an inner dialogue with yourself, use different methods of engaging in active reading and resources, which provoke critical thinking to solve problems of the situation.	The degree of penetration in the essence of different subjects, the level of exposure and argumentation of the information, the quality of the conclusions, the elements of creativity, the way of solving the problem of the situation, the systematization capacity of the material	During semester
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IX. SUGGESTION METHODOLOGY IN TEACHING-LEARNING-EVALUATION

• *Methods of learning and teaching*

The discipline of Human Physiology is a compulsory discipline and is taught according to the classical university standard: lectures, seminars and practical papers.

The theoretical course at lectures is held by the course holders.

At the initial practical work, the basic theoretical notions are discussed using virtual applicative techniques on the subject, laboratory works are carried out: animal experiments, virtual experiments and the use of the computerized BIOPAC system. The paper finishes with the completion of the minutes.

At the totalizing lessons on certain chapters, the training method based on the problem analysis (clinical case) is applied.

• *Applied didactic strategies*

Try to understand the notion of queues, explained by the teacher, but do not focus on evaluation methods, learned not to support totals and to be admitted to the session, but to gain knowledge that you will use later in other disciplines.

The course is designed to meet the students' needs for training and professional development, so ask the teacher, that each information is argued through examples, applications, theoretical and practical problems, this will provide an active learning environment.

Develop metacognition - inner dialogue with yourself, it will help you build learning skills that will allow you to control your professional training.

Use different nonverbal resources like schemes, documents, experiences, devices, they support the formation of professional skills, create work tasks, the solution of which will have real consequences.

Use different methods of engaging in active reading and resources, which causes critical thinking to solve situations, they increase the student's systematization capacity.

"Try to be a teacher", explain to colleague / colleagues the key moments of the subject studied, give their own examples, explain the difficult moments, listen to their opinions. The ability to explain to colleagues the material will increase your ability to think and express yourself.

• *Didactic strategies applied*

The BIOPAC MP36 Data Acquisition System, which allows the recording of over 20 physiological parameters of the human organ and its subsequent analysis. This data will allow students to form teams, share tasks, record results and follow a given protocol;



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The simulation program of the Physiology Laboratory Ph.I.L.S. 4.0 (Physiology Interactive Lab Simulations);

PhysioEx 9.0 (Laboratory Simulations in Physiology) physiology laboratory simulation program; Virtual Physiology Software that allows viewing movies with physiological experiences or clinical investigation methods;

Clinical case presentation - as a method of training based on the clinical situation analysis of a virtual patient, role-playing "patient-student-teacher" that will allow to connect the theoretical and practical knowledge that serves as a platform for clinical training.

Assessment methods (including method of calculation of the final grade)

The **current assessment** at the Department of Human Physiology and Biophysics for 1 year students includes 3 totals in each semester, in the form of computerized tests consisting of 30 questions each (simple compliment and multiple compliment). The student has a total of 30 minutes to answer the test. The evaluation is performed according to the criteria of the concordance system (MOODLE variant). The score is marked with notes from 0 to 10. The average annual score is calculated from 6 notes obtained at totals during the year.

At the Human Physiology Discipline promotion exam, students with an annual average less than grade 5 and students who have not recovered absences from laboratory work are not admitted.

The **final evaluation** takes place in the computer assessment room of the USMF. A computerized test from the final assessment consists of variants of 100 tests each in all subjects of the Human Physiology course, of which 40 tests are simple compliment, 60 multiple compliment tests. The student has a total of 2 astronomical hours to answer the tests. The test is scored with grades from 10 to 0.

The final grade consists of 2 components: annual average X 0.5; computerized test X 0.3.

Methods of rounding if assessment grades

Grades (average annual, examination)	National grading 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	
5,51-6,0	6	
6,01-6,50	6,5	D
6,51-7,00	7	
7,01-7,50	7,5	C
7,51-8,00	8	
8,01-8,50	8,5	B
8,51-9,00	9	
9,01-9,50	9,5	A
9,51-10,0	10	

The average annual mark and the scores of all the final examination (computer assisted, test, oral) - all will be expressed in numbers according to the scoring scale (according to the table), and the final grade obtained will be expressed in two decimal digits will be transferred to the notes book.

Failure to attend the examination without good reason is recorded as "absent" and is equivalent to 0 (zero). The student is entitled to 2 repeated claims of the unsuccessful exam.

X. RECOMMENDED BIBLIOGRAPHY



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A. Compulsory:

1. Arthur C. Guyton, John E. Hall "Textbook of medical physiology" 11th, 12th, 13th edition, 2006, 2011, 2016
2. V. Vovc et al. "Experimental physiology" Chisinau, 2015

B. Supplementary

1. Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwen L. Brooks "Ganong's Review of medical physiology" 25th edition, 2015
2. Linda S. Constanzo "Physiology (Board Review Series)" 5th edition, 2010
3. Ira Stuart Fox "Human Physiology" 14th edition, 2015