



## CD 8.5.1 DISCIPLINE CURRICULUM

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**FACULTY OF MEDICINE**  
**STUDY PROGRAM 0912.1 MEDICINE**  
**DEPARTMENT OF HUMAN ANATOMY**

**APPROVED**

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

Minutes No. 6 of 22.09.17

Chairman, PhD, associate professor

Suman Serghei

(signature)

**APPROVED**

at the Council meeting of the Faculty of Medicine

Minutes No. 4 of 20.09.17

Dean of Faculty, PhD, associate professor

Placintă Gheorghe

(signature)

**APPROVED**

at the meeting of the chair of Human Anatomy  
Minutes No.02 of 27.09.2017

Head of chair, PhD, university professor

Catereniuc Ilia

(signature)

## SYLLABUS

**DISCIPLINE HUMAN ANATOMY**  
***Functional anatomy of neurovegetative system***

**Integrated studies**

Type of course: **Optional discipline**

**Chisinau, 2017**



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### 1. INTRODUCTION

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

**Autonomic division** [*Divisio autonómica; Pars autonómica systematis nervosi* (1998, IFAA; FICAT)] or **vegetative nervous system**, often called *visceral nervous system* or *visceral motor system*, is a specialized part of the nervous system as a whole, which guides the activity of all organs involved in the vegetative functions of the body (nutrition, respiration, excretion, reproduction, circulation of liquids).

Its functionality is regulated by the cortex of the cerebral hemispheres; therefore, it is integrated into the nervous system as a whole.

**The autonomic (vegetative) nervous system (ANS)** ensures the innervation of blood and lymphatic vessels, viscera, glandular tissue, smooth (involuntary) muscles, cardiac muscle and conducting system of the heart, performs the adaptive-trophic functions and maintains a constant level of the internal environment of the organism.

In the body there is a permanent correlative activity of the somatic and vegetative parts of the nervous system, because only in this way it is possible to regulate adequately all the vital functions.

In the cerebral hemispheres and brainstem the vegetative and somatic nerve centers are located next to one another, and their nerve fibers usually pass through the same nerves.

The course of the **functional anatomy of the neurovegetative system** is dedicated to a more in-depth studies of the structure and function of the components of the autonomic (vegetative) nervous system at the macro-, meso- and microscopic level, as well as its interaction and interdependence on the somatic nervous system. Both of these compartments are parts of the nervous system as a whole and are closely linked both by their embryological origins and by their structure and functions.

- **Mission of the curriculum (aim) in professional training**

The course of the *functional anatomy of the neurovegetative system* aims to study the morphofunctional features of this system and to form the competences related to the structure and functions of the component parts of the autonomic (vegetative) nervous system and to use this knowledge in the learning of basic and clinical disciplines, prevent various diseases, diagnose and treat them.

Knowing the particular structure of the components of the neurovegetative system is necessary for studying innervation of the viscera and somatic formations as well as the diseases of various organs and systems.

- **Languages of the course:** English.
- **Beneficiaries:** students of the first year, Faculty of Medicine no. 2, specialty *Medicine*



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### II. MANAGEMENT OF THE DISCIPLINE

Code of the discipline	<b>S.02.A.020</b>		
Name of the discipline	<b>Functional anatomy of the neurovegetative system</b>		
Person(s) in charge of the discipline	PhD, university professor <b>Ilia Catereniuc</b>		
Year	<b>I</b>	Semester	<b>II</b>
Total number of hours, <i>including</i> :			<b>30</b>
Lectures	<b>20</b>	Practical/laboratory hours	-
Seminars	-	Self-training	<b>10</b>
Clinical internship (total hours)			-
Form of assessment	<b>C</b>	Number of credits	<b>1</b>

### III. TRAINING AIMS WITHIN THE DISCIPLINE

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

✓ *at the level of knowledge and understanding:*

- form clear and accurate ideas about the autonomic (vegetative) nervous system, its component parts, its role and place within the nervous system and among the basic and clinical medical disciplines;
- know traditional and modern methods of examination of the neurovegetative system;
- possess and reproduce information about structure and functions of the component parts of the autonomic nervous system (ANS);
- comprehend and reproduce general notions about the sympathetic, parasympathetic and metasympathetic parts of the autonomic nervous system;
- know International Anatomical Terminology elaborated by FICAT (Federative International Committee on Anatomical Terminology, 1998) related to the autonomic (vegetative) nervous system.

✓ *at the application level:*

- identify anatomical formations related to the autonomic (vegetative) nervous system;
- reproduce schemes referring to the structure, topography and classification of the anatomical formations associated to the autonomic (vegetative) nervous system;
- solve case based problems and tests on the structure, topography, functions, and other aspects of the neurovegetative system;
- possess abilities to apply knowledge about the neurovegetative system in order to acquire basic and clinical disciplines.

✓ *at the integration level:*

- evaluate the place and role of the neurovegetative system in the preclinical training of the future physician;
- appreciate the importance of knowledge in the field of the autonomic nervous system in order to acquire clinical disciplines and to become aware of their applicability in the diagnosis and treatment of diseases;
- use information technologies to obtain, evaluate, store, produce, present and exchange information with colleagues in individual and group work;
- implement the gained knowledge in the research activity;
- be able to learn learning, that will contribute to the management of the professional activity.



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### IV. PROVISIONAL TERMS AND CONDITIONS

Through the diversity of its interrelations on the regulation of body functions the vegetative nervous system remains the most passionate field of contemporary medicine

In order to acquire this discipline it is necessary to have a thorough knowledge of anatomy of the nervous system, embryology and biology, obtained during the pre-university and university studies.

*Student of the first year needs the following skills for a good comprehension of the discipline:*

- knowledge of the language of instruction;
- confirmed competences in the sciences studied at lyceum (biology, chemistry, physics);
- digital competences (use of the Internet, document processing, electronic tables and presentations, use of graphics programs);
- ability to communicate and to work in team;
- qualities – tolerance, compassion, creativity, initiative, autonomy.

### V. THEMES AND ESTIMATE ALLOCATION OF HOURS

No.	TEMA	Number of hours	
		Lectures	Self-training
1.	Functional anatomy of the autonomic (vegetative) nervous system. Brief history of knowledge evolution related to the autonomic (vegetative) nervous system.	2	
2.	Contemporary data on the structure and development of the neurovegetative system. Central level of organizing the neurovegetative system.	2	1
3.	Peripheral level of organizing the neurovegetative system. Vegetative ganglia and their neuronal composition. Types of fibers within the autonomic nervous system and interneuronal and neurotissue relationships.	4	2
4.	Differences between vegetative and somatic nervous systems. Reflex arc of the vegetative nervous system.	2	2
5.	Sympathetic nervous system.	2	1
6.	Parasympathetic nervous system.	2	1
7.	Metasympathetic nervous system.	2	1
8.	Visceral sensitivity. Viscero-visceral connections. Peculiarities of the innervation of the viscera and somatic formations.	4	2
<b>Total</b>		<b>20</b>	<b>10</b>
<b>TOTAL</b>		<b>30</b>	



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### VI. REFERENCE OBJECTIVES AND CONTENT UNITS

Objectives	Content units
<p><b>Chapter 1.</b>  <b>FUNCTIONAL ANATOMY OF AUTONOMIC (VEGETATIVE) NERVOUS SYSTEM.</b>  <b>CONTEMPORARY DATA ABOUT STRUCTURE AND DEVELOPMENT OF THE</b>  <b>NEUROVEGETATIVE SYSTEM</b></p>	
<ul style="list-style-type: none"> <li>● <b>to define:</b> <ul style="list-style-type: none"> <li>✓ basic concepts of the autonomic (vegetative) nervous system (ANS);</li> <li>✓ vegetative nervous system;</li> <li>✓ somatic nervous system;</li> <li>✓ spinal and bulbar innervation of internal organs;</li> </ul> </li> <li>● <b>to know:</b> <ul style="list-style-type: none"> <li>✓ anatomy research methods of the ANS;</li> <li>✓ principles of classification, structure and topography of the vegetative nervous system;</li> <li>✓ structural features of the ANS;</li> <li>✓ differences between the autonomic and somatic nervous systems;</li> <li>✓ Anatomical Terminology related to the neurovegetative system;</li> </ul> </li> <li>● <b>to demonstrate:</b> <ul style="list-style-type: none"> <li>✓ abilities for analysis and systematization of knowledge;</li> </ul> </li> <li>● <b>to apply:</b> <ul style="list-style-type: none"> <li>✓ criteria for differentiation of vegetative formations on anatomical samples;</li> </ul> </li> <li>● <b>to integrate:</b> <ul style="list-style-type: none"> <li>✓ acquired knowledge and apply them in practice.</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li><b>1.</b> Anatomical Terminology.</li> <li><b>2.</b> Autonomic (vegetative) nervous system – generalities, component parts.</li> <li><b>3.</b> Classification of the ANS components: <ul style="list-style-type: none"> <li>✓ sympathetic part (<i>pars sympathica</i>);</li> <li>✓ parasympathetic part (<i>pars parasympathica</i>);</li> <li>✓ metasympathetic part (<i>pars metasympathica</i>).</li> </ul> </li> <li><b>4.</b> Anatomical vegetative formations.</li> </ol>
<p><b>Chapter 2.</b>  <b>CENTRAL LEVEL OF ORGANIZATION OF THE NEUROVEGETATIVE SYSTEM.</b></p>	
<ul style="list-style-type: none"> <li>● <b>to define:</b> <ul style="list-style-type: none"> <li>✓ central level of autonomic (vegetative) nervous system;</li> </ul> </li> <li>● <b>to know:</b> <ul style="list-style-type: none"> <li>✓ components of the central level of the ANS;</li> <li>✓ structural features of the components of the central level of the ANS;</li> <li>✓ principles of classification, structure and topography of the components of the central level of the ANS;</li> </ul> </li> <li>● <b>to demonstrate:</b> <ul style="list-style-type: none"> <li>✓ anatomical formations on cadavers, castings, radiographs and on a living person;</li> </ul> </li> <li>● <b>to apply</b> <ul style="list-style-type: none"> <li>✓ criteria for differentiation of anatomical formations on anatomical samples and dead body;</li> </ul> </li> <li>● <b>to integrate</b> anatomical knowledge with clinical disciplines by: <ul style="list-style-type: none"> <li>✓ concluding on the studied subject;</li> <li>✓ developing own opinions on the individual, age and gender anatomic peculiarities of the components of the central level of the ANS.</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li><b>1.</b> Central level of vegetative nervous system.</li> <li><b>2.</b> Segmental vegetative centers.</li> <li><b>3.</b> Supreme / suprasedgmental vegetative centers.</li> </ol>



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Objectives	Content units
<b>Chapter 3.</b> <b>PERIPHERAL LEVEL OF ORGANIZATION OF THE NEUROVEGETATIVE SYSTEM</b>	
<ul style="list-style-type: none"> <li>• <b>to define:</b></li> <li>✓ peripheral level of autonomic (vegetative) nervous system;</li> <li>• <b>to know:</b></li> <li>✓ components of the peripheral level of the ANS;</li> <li>✓ structural features, principles of classification, structure and topography of the components of the peripheral level of the ANS;</li> <li>• <b>to demonstrate:</b></li> <li>✓ anatomical formations on cadavers, castings etc.;</li> <li>• <b>to apply:</b></li> <li>✓ criteria for differentiation of anatomical formations on anatomical samples and dead body;</li> <li>• <b>to integrate:</b></li> <li>✓ anatomical knowledge with clinical disciplines by concluding on the studied subject.</li> </ul>	<ol style="list-style-type: none"> <li>1. Peripheral level of vegetative nervous system:               <ul style="list-style-type: none"> <li>✓ <i>nerve ganglia;</i></li> <li>✓ <i>nerve fibers;</i></li> <li>✓ <i>vegetative nerves and communicating branches (rami);</i></li> <li>✓ <i>vegetative plexuses;</i></li> <li>✓ <i>effector nerve endings.</i></li> </ul> </li> <li>2. Ganglia of I-III and IV order.</li> <li>3. Vegetative reflex arc.</li> </ol>
<b>Chapter 4.</b> <b>SYMPATHETIC NERVOUS SYSTEM. PARASYMPATHETIC NERVOUS SYSTEM. METASYMPATHETIC NEUROVEGETATIVE SYSTEM. PECULIARITIES OF INNERVATION OF VISCERA AND SOMATIC FORMATIONS</b>	
<ul style="list-style-type: none"> <li>• <b>to define:</b></li> <li>✓ sympathetic nervous system;</li> <li>✓ parasympathetic nervous system;</li> <li>✓ metasympathetic nervous system;</li> <li>✓ visceral sensitivity;</li> <li>✓ viscerovisceral connections;</li> <li>• <b>to know:</b></li> <li>✓ structure and functions of components of the sympathetic nervous system;</li> <li>✓ structure and functions of components of the parasympathetic nervous system;</li> <li>✓ structure and functions of components of the metasympathetic nervous system;</li> <li>✓ principles of classification and topography of the components of the sympathetic, parasympathetic and metasympathetic systems;</li> <li>✓ structural features of the components of the sympathetic, parasympathetic and metasympathetic systems;</li> <li>✓ peculiarities of the innervation of the viscera and somatic formations;</li> <li>• <b>to demonstrate:</b></li> <li>✓ anatomical formations on cadavers, castings, radiographs and on a living person;</li> <li>• <b>to apply:</b></li> <li>✓ criteria for differentiation of anatomical formations on anatomical samples and dead body;</li> <li>• <b>to integrate</b> anatomical knowledge with clinical disciplines by:               <ul style="list-style-type: none"> <li>✓ concluding on the studied subject;</li> <li>✓ developing own opinions on the individual, age and gender anatomic peculiarities of the components of the sympathetic, parasympathetic and metasympathetic systems.</li> </ul> </li> </ul>	<ol style="list-style-type: none"> <li>1. Sympathetic nervous system – components, functions, (central and peripheral) parts, structural features.</li> <li>2. Parasympathetic nervous system – components, functions, (central and peripheral) parts, structural features.</li> <li>3. Metasympathetic nervous system – components, functions, (central and peripheral) parts, structural features.</li> <li>4. Visceral sensitivity.</li> <li>5. Viscerovisceral connections.</li> <li>6. Peculiarities of the innervation of the viscera and somatic formations.</li> </ol>



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

#### ✓ PROFESSIONAL COMPETENCES (specific) (SC):

- CP1. Knowledge, understanding and use of anatomical language appropriate to neurovegetative system;
- CP2. Knowledge of the features of the structure, development and functioning of the autonomic (vegetative) nervous system;
- CP3. Knowledge of the organization of the neurovegetative system;
- CP4. Identification of anatomical formations related to the autonomic (vegetative) nervous system;
- CP5. Application of gained knowledge at the discipline in medical practice;
- CP6. Solving of the problems of situation and formulating the conclusions;
- CP7. Performing of various practical exercises and procedures for carrying out specific professional activities based on anatomical knowledge related to the autonomic (vegetative) nervous system and other fundamental disciplines.

#### ✓ TRANSVERSAL COMPETENCES (TC):

- CT1. Developing autonomic decisional capacity;
- CT2. Formation of personal attitude;
- CT3. Ability of social interaction and group activity;
- CT4. Fitting in interdisciplinary projects, extracurricular activities;
- CT5. Performing activities and exercising the specific role for studying the discipline in the team;
- CT6. Developing different learning techniques;
- CT7. Selection of digital materials, critical analysis and conclusions;
- CT8. Presentation of individual scientific projects;
- CT9. Objective self-evaluation of continuing vocational training skills to develop personal and professional skills.

#### ✓ STUDY OUTCOMES

- to have knowledge about structure, topography and anatomical features of the autonomic (vegetative) nervous system;
- to understand the principles of application and transfer of knowledge in medical practice;
- to evaluate the place and role of the neurovegetative system in the preclinical training of the medical student;
- to be able to implement the gained knowledge in the research activity;
- to possess skills to analyze and synthesize acquired knowledge and information and to be able to use information and communication technologies.



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### VIII. STUDENT'S SELF-TRAINING

No.	Expected product	Implementation strategies	Assessment criteria	Implementation terms
1.	Working with bibliographic sources and information resources	<p>To study carefully the material in the handbook and the lecture on the subject.</p> <p>To get acquainted with topics that require reflection on the subject/ matter.</p> <p>To get acquainted with the list of additional information sources on the topic and selecting the most suitable sources for studying the material with the identification of the key of the topic.</p> <p>To formulate conclusions on the importance of the studied topic .</p>	Ability to extract the essentials; interpretative skills, workload.	During the optional course
2.	Work with materials of the optional course	<p>Before starting work, the student has to get acquainted with the topic and to analyze the information from the <b>methodical indication</b>, lectures, schemes collections and other sources that help him accomplish his tasks.</p> <p>Consecutive solving of the tasks.</p> <p>At the end of each theme, some conclusions have to be made, which can be discussed with the colleagues.</p> <p>Verification of the finalities and appreciation of their achievement.</p> <p>Additional information sources have to be consulted in order to carry out the task of the student.</p>	Workload; work with materials of the optional course, and solving the proposed tasks on the topic; ability to formulate conclusions.	During the optional course
3.	Work with on-line materials	Self-assessment by viewing on-line resources, studying on-line materials on the SITE department, etc. expressing own opinions through forum and chat.	Number and duration of SITE entries, self-evaluation results	During the optional course





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### IX. METHODOLOGICAL SUGGESTIONS FOR TEACHING-LEARNING-ASSESSMENT

#### • *Teaching methods used*

Optional course *Functional Anatomy of the Neurovegetative System* is delivered according to the classical methodology; with lectures and individual work.

The lectures are read by the course holders. The interactive lectures are practiced.

When teaching the optional course of the *functional anatomy of the neurovegetative system*, different methods and didactic procedures are used, oriented towards efficient learning and achieving the objectives of the didactic process

In the theoretical lessons, along with the traditional methods (*course-exposure, course-conversation, synthesis course*), modern methods (*course-debate, problem-solved course*) are used.

In individual work, students use individual, frontal, group-based forms of activity.

For the deeper learning of the material, different semiotic systems (scientific language, graphical and computerized language) and teaching materials are used.

During the courses and extracurricular activities are used Information Communication Technologies - PowerPoint presentations.

#### • *Recommended learning methods*

##### **Observation**

Identification of characteristic elements of anatomical structures specific to the neurovegetative system and their description.

##### **Analysis**

Imaginary decomposition of the whole into component parts. Highlighting the essential elements. Studying each element as part of the whole.

##### **Scheme / figure analysis**

Selection of necessary information. Recognition based on knowledge and selected information of structures indicated in the scheme, drawing. Analysis of the functions / role of recognized structures.

##### **Comparison**

Analysis the first object / process in a group and determination of its essential features. Analysis of the second object / process and determination of its essential features. Comparing objects / processes and highlighting common features. Comparing objects/processes and determining differences. Establishment criteria of differentiation. Formulation of conclusions.

##### **Classification**

Identifying the structures / processes to be classified. Determining the criteria by which the classification is to be made. Distribution of structures / processes into groups according to established criteria.

##### **Elaboration of scheme**

Selection of elements, which must be included in the scheme. Reproducing the selected elements by different symbols / colors and indicating their relationships. Wording of an appropriate title and legend of the symbols used.

##### **Modeling**

Identification and selection of the elements needed to model the phenomenon. Imaging (graphically, schematically) the studied phenomenon. Realization of the phenomenon using the developed model. Formulation of conclusions, deduced from arguments or findings.

##### **Experiment**

Formulating a hypothesis, starting from known facts, related to the studied process/phenomenon. Verifying the hypothesis by performing the studied processes / phenomena under laboratory conditions. Formulation of conclusions, deduced from arguments or findings.

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

"Round table"; "Group Interview"; "Case Study".

Virtual Practical Works.



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

**Current:** frontal/individual assessment of knowledge by:

- ✓ control works;
- ✓ demonstration of anatomical structures included in the analytical curriculum of the discipline on the anatomical samples;
- ✓ solving problems/exercises;
- ✓ graphical representation of the schemes on certain subjects.

**Final: Colloquium.**

The **overall score** is made up of the average score of those obtained during the module (share 0.5), the second task represents the discourse on the heard topics (share 0.5).

The overall score and scores of all the final stages of the assessment (the discourse on the heard topics) - all will be expressed in numbers according to the scoring scale (according to the table) and the final mark obtained will be expressed by the **admitted / rejected** grade with passing the result in the notebook (or report card).

### Method of mark rounding at different assessment stages

Intermediate marks scale (annual average, marks from the examination stages)	National Assessment System	ECTS Equivalent
1,00-3,00	2	F
3,01-4,99	4	FX
5,00	5	E
5,01-5,50	5,5	
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
8,51-8,00	9	
9,01-9,50	9,5	A
9,51-10,0	10	

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

## X. RECOMMENDED LITERATURE:

### A. Compulsory:

1. Course materials.
2. PRIVES M., LYSENKOV N., BUSHKOVICH V. Human Anatomy, vol. II. /The science of the vessels. The science of the nervous system. The science of the sense organs. / Translated from the Russian by Ludmila Aksenova. 1985. Mir Publishers, Moscow, 1989.
3. GLOBA L. Human Anatomy. Neurology with Sense Organs and Angiology. 2<sup>nd</sup> edition. Chişinău, 2018.
4. CATERENIUC I., LUPAŞCU T., TAŞNIC M. et al. Culegere de scheme la anatomia omului / Сборник схем по анатомии человека / Collection of schemes for human anatomy. Ed. a V-a (revăzută şi completată). Ch.: Tipografia Sirius SRL, 2012, 2014

### B. Additional:

1. KEITH L. MOORE, ARTUR F. DALLEY, ANNE M.R. AGUR. Clinically Oriented Anatomy, 6-th ed., 2007.
2. NETTER FRANK H. Atlas of Human Anatomy. 4-th Edition, Elsevier, 2006.