

**SPECIALIST DEGREE PROGRAMME 31.05.01 ‘GENERAL MEDICINE’**

**COURSE (MODULE) ‘Normal physiology’**

**OVERVIEW**

Mode of study	full time	
Faculty	International Institute of Medical Education and Cooperation	
Department	Normal physiology	
Year	2	
Semester –	3, 4 – Normal physiology (252 ac.h.)	*ac. h. – academic hours
Lectures –	24 ac.h.	
Exam –	4 semester 9 ac.h	
Practical classes	87 ac.h	
Contact classes	111 ac.h.	
Self-study	132 ac.h	
Total workload	252 ac.h (7 credits)	

The course (module) is devised according to FSES HE requirements approved on February,9, 2016 by Order of Ministry of Health, Russian Federation) and vocational functions of General Practitioner (primary care physician, district doctor) Professional Standard.

**1. THE COURSE AIM AND SCOPE**

**The aim:**

- Familiarization of students with the aspects of a healthy person’s life and the physiological basis of a healthy lifestyle is the methodological foundation of medicine, mainly its preventive direction, as well as the scientific basis for diagnosing health and predicting the functional activity of the human body.
- Formation of systemic knowledge about the life of the organism as a whole, its interaction with the external environment and the dynamics of life processes, an idea of the basic laws of the functioning of the body systems and the mechanisms of their regulation, familiarization with the most important principles and ways of compensating for functional deviations, providing a theoretical basis for further study of clinical discipline based on knowledge of the physiology of a healthy organism.
- Education skills improvement of a modern doctor. In this regard, normal physiology, relying on the achievements of biomedical disciplines, mathematics, physics, chemistry, philosophy, should be close to the tasks of modern medicine in medical universities. It should be taught on the basis of the analytical and systemic approaches of both the various functions of a healthy body and the mechanisms of their regulation. When studying normal physiology, students should receive the basis of physiological knowledge and skills provided for in the normal physiology program.

**The course focuses on**

- subject, purpose, objectives of the discipline and its significance for its future activities;
- the main stages in the development of physiology and the role of domestic scientists in its creation and development;
- patterns of functioning and mechanisms of regulation of the activity of cells, tissues, organs, systems of a healthy organism, considered from the perspective of general physiology, private physiology and integrative human activities;
- the essence of research methods of various functions of a healthy body, which are widely used in practical medicine, etc.

As a result of studying normal physiology, students should be able to:

- use the dialectical principle as a generalized approach to the knowledge of the general physiological laws of the life of a healthy organism in various conditions of its existence;
- explain the principle of the most important methods for studying the functions of a healthy body;
- independently work with scientific, educational, reference and educational literature;
- independently carry out laboratory work, put experiments on experimental animals, protect the protocols of experiments, solve test tasks and situational tasks, prepare scientific reports, etc .;
- explain the informational value of various indicators and the mechanisms of regulation of the activity of cells, tissues, organs and systems of the whole organism that support these constants;
- evaluate and explain the basic laws of the formation and regulation of the physiological functions of the body when achieving a useful adaptive result at different stages of the development of the body;
- evaluate and explain the general principles of activity construction and the importance of leading functional systems;
- evaluate and explain the patterns of formation and regulation of the basic forms of the organism's behavior depending on the conditions of its existence;
- evaluate and explain age-related features of the functioning of the physiological systems of the body, etc.

The study of normal physiology should help students to form and develop a dialectic-materialistic worldview, contribute to the development of physiological thinking, help to generalize and comprehend the data of various medical sciences from general physiological positions, help to comprehend both the applied and fundamental tasks of modern medicine, which will improve the training of a modern general practitioner.

## **2. THE COURSE POSITION IN SPECIALIST DEGREE PROGRAMME 31.05.01 'GENERAL MEDICINE'**

The discipline "normal physiology" refers to the basic cycle of disciplines in the specialty of medical business of higher professional medical education, is studied in the third and fourth semesters and the following knowledge is necessary for its mastery:

1. philosophy, bioethics, psychology, pedagogy, history of medicine, Latin
  2. physics and mathematics, biology, human anatomy, histology, embryology, cytology
- Human anatomy (morphological basis for the study of functions). Myology, splanchnology, angiology, neurology, hematopoietic organs and immune system, esthesiology ..
  - Biology. Cell biology. Genotype and phenotype. Individual development, types, periods of development. Elementary processes of the body. Body aging. Homeostasis. Common human health problems. Regeneration as a structural basis of homeostasis. The principles of the evolution of organs, functions. Ecology. The specificity of human ecology. Biosphere. Noosphere.
  - Biological and medical physics. Thermodynamics of open systems, flows of substances, energy, entropy, information. Homeostasis, homeokinesis. Transients. Biophysics of cell membranes. Basics of electrogenesis. Electrical properties of nerve conductors. Biophysics of synaptic processes. Biophysics of muscle contraction and relaxation. Elements of the theory of information and control theory. The body as an automatic control system. Hydrodynamics, biomechanics. Acoustics, optics, electricity.
  - Biophysical, bioorganic and biological chemistry. Osmotic and oncotic pressure. The main classes of natural organic compounds, their metabolism (proteins, nucleic acids,

carbohydrates, lipids). Vitamins, enzymes, hormones. Biochemistry of the liver, blood, kidneys, urine, nervous and muscle tissue. Common pathways of catabolism. Biological oxidation.

- Histology. Embryology, cytology. Epithelial, connective tissue. Blood. Muscular and nerve tissue. Nervous system. Cardiovascular, endocrine, digestive, respiratory, excretory and reproductive systems. The sensory organs. Blood formation.
- Philosophy. Worldview and methodological function of philosophy. Basic laws and categories of philosophy. Cognition as a reflection of reality. Methods and forms of scientific knowledge. Different concepts of cognition. Religious, atheistic, moral consciousness, science and culture. Matter and consciousness. Philosophical aspects of the work of I.M. Sechenova, I.P. Pavlova, P.K. Anokhin.
- Latin language. Terminology.
- Medical informatics. Theoretical foundations of informatics, search, collection, storage and processing of information in medical and biological systems, the ability to use information computer systems.

### 3. OUTCOME COMPETENCIES OF THE COURSE

On completing the course a student is expected to:

Learning outcomes	Competency developed: a description of (compulsory) threshold level	Competency code
1	2	3
<p><b>Know</b>            basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; the main mechanisms for regulating the functions of the physiological systems of the body (molecular, cellular, tissue, organ, organ-system, organisms); principles of modeling physiological functions; features of the development of excitation and inhibition in the human body; mechanisms of motor functions.</p> <p><b>Be able to:</b>            measure the most important indicators of human activity at rest;            analyze the results of an experimental study of physiological functions in the norm (see the list of skills);</p> <p><b>Skills:</b>            skills to measure the basic functional characteristics of the body (see list of skills);</p>	<p><b>General Cultural Competencies (GCC - the ability to abstract thinking, analysis, synthesis;</b></p>	<p>GC -1</p>

<p><b>Know</b></p> <p>basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; the main mechanisms for regulating the functions of the physiological systems of the body (molecular, cellular, tissue, organ, organ-system, organisms); principles of modeling physiological functions; features of the development of excitation and inhibition in the human body; mechanisms of motor functions.</p> <p><b>Be able to:</b></p> <p>measure the most important indicators of human activity at rest;</p> <p>analyze the results of an experimental study of physiological functions in the norm (see the list of skills);</p> <p><b>Skills:</b></p> <p>skills to measure the basic functional characteristics of the body (see list of skills);</p>	<p>readiness for self-development, self-realization, self-education, the use of creative potential;</p>	<p>GC -5</p>
<p><b>Know:</b></p> <p>basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; the main mechanisms for regulating the functions of the physiological systems of the body (molecular, cellular, tissue, organ, organ-system, organisms); principles of modeling physiological functions; features of the development of excitation and inhibition in the human body; excitation transmission; mechanisms of motor functions.</p> <p><b>Be able to:</b></p> <p>Use literature, including Internet resources, to prepare abstract reports, analyze the results of experiments; be able to measure the most important indicators of human activity at rest; analyze the results of an experimental study of physiological functions in the norm (see list of skills);</p> <p><b>Skills:</b></p> <p>skills to measure the basic functional characteristics of</p>	<p><b>General professional competencies (GPC)</b></p> <p>readiness to solve standard tasks of professional activity using information, bibliographic resources, biomedical terminology, information and communication technologies and taking into account the basic requirements of</p>	<p>GPC -1</p>

<p>the body (see list of skills); analysis of the results of an experimental study of physiological functions is normal.</p>	<p>information security;</p>	
<p><b>Know:</b>  basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; basic mechanisms of regulation of the physiological systems of the body.</p> <p><b>Be able to:</b>  Use literature, including Internet resources, for the preparation of abstract reports; be able to measure the most important indicators of human activity at rest; analyze the results of an experimental study of physiological functions in the norm (see the list of skills);</p> <p><b>Skills:</b>  skills to measure the basic functional characteristics of the body (see list of skills);</p>	<p>the ability and readiness to analyze the results of their own activities to prevent professional errors;</p>	<p>GPC -5</p>
<p><b>Know:</b>  basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; basic mechanisms of regulation of the physiological systems of the body.</p> <p><b>Be able to:</b>  Use literature, including Internet resources, for the preparation of abstract reports; be able to measure the most important indicators of human activity at rest; analyze the results of an experimental study of physiological functions in the norm (see the list of</p>	<p>readiness to use basic physicochemical, mathematical and other natural science concepts and methods in solving professional problems;</p>	<p>GPC -7</p>

<p>skills);</p> <p><b>Skills:</b></p> <p>skills to measure the basic functional characteristics of the body (see list of skills);</p>		
<p><b>Know:</b> basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; the main mechanisms for regulating the functions of the physiological systems of the body (molecular, cellular, tissue, organ, organ-system, organisms); principles of modeling physiological functions; features of the development of excitation and inhibition in the human body; excitation transmission; mechanisms of motor functions.</p> <p><b>Be able to:</b></p> <p>Use literature, including Internet resources, to prepare abstract reports, analyze the results of experiments; be able to measure the most important indicators of human activity at rest; analyze the results of an experimental study of physiological functions in the norm (see list of skills);</p> <p><b>Skills:</b></p> <p>skills to measure the basic functional characteristics of the body (see list of skills); analysis of the results of an experimental study of physiological functions is normal.</p>	<p><b>Professional competences (PC)</b></p> <p>readiness to teach patients and their relatives basic hygiene measures of a healthimproving nature, skills of self-monitoring of basic physiological indicators that contribute to the preservation and promotion of health, and the prevention of diseases;</p>	<p>PC -15</p>
<p><b>Know:</b></p> <p>basic physiological concepts and terms used in medicine; morphofunctional organization of a person, features of life activity in various periods of individual development and during pregnancy; the main mechanisms for regulating the functions of the</p>	<p>readiness to educate on the elimination of risk factors and the formation of skills for a healthy lifestyle.</p>	<p>PC -16</p>

<p>physiological systems of the body (molecular, cellular, tissue, organ, organ-system, organisms); principles of modeling physiological functions; features of the development of excitation and inhibition in the human body; excitation transmission; mechanisms of motor functions.</p> <p><b>Be able to:</b> Use literature, including Internet resources, to prepare abstract reports, analyze the results of experiments; be able to measure the most important indicators of human activity at rest; analyze the results of an experimental study of physiological functions in the norm (see list of skills);</p> <p><b>Skills:</b> skills to measure the basic functional characteristics of the body (see list of skills); analysis of the results of an experimental study of physiological functions is normal.</p>		
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#### 4. THE COURSE (MODULE) ‘Normal physiology’ SYLLABUS AND CONTENTS

**Total workload is 7 credits (252 ac.h.)**

№ п/ п 1	Part (Module)	semester	week of the semester	Study forms (including self-study and workload in ac.h.)				Formative assessment ( <i>weekly</i> ) Summative assessment ( <i>by semesters</i> )
				Lectur es	Practica l classes	Semi nars	Self- study	
1	Normal physiology	3		10	51	-	65	Q T C A No formal control
2	Normal physiology	4		14	36	-	67	Q T C A Exam (9 ac.h)
	sum	3-4		24	87	-	132	Q T C A Exam (9 ac.h)

**Q - Questions, T –Test , C – Cases, A – Algorithms of performance**

**Head of Normal physiology Department**  
(the name of the Chair)



Ass. Prof

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