Khanty-Mansiysk Autonomous Okrug-Ugra
"Surgut State University"

Approved by
Deputy Rector for Academic Affairs

_____E.V. Konovalova

"11" June 2026, Record No.5

Adaptive and age-related physiology

Syllabus

Department **Morphology and physiology**

Curriculum s310501-LечДеLoИн-26-3.pxml
Specialty 31.05.01 General Medicine

Qualification **General Practitioner**

Form of education **Full-time**

Total (in credits) 2

Total academic hours 72
including:
Classes 48
Self-study 24

Control:
Credit 6th Term

Course outline in terms

Academic year (Term)	**3 (6)**		Total	
Weeks	17 2/6			
Types of classes	Cur	Syl	Cur	Syl
Lectures	16	16	16	16
Practical	32	32	32	32
Total classes	48	48	48	48
Contact work	48	48	48	48
Self-study	24	24	24	24
Total	72	72	72	72

The Syllabus is compiled by:
PhD in Biological Sciences, Professor, Maltsev V.P.

The Syllabus

Adaptive and age-related physiology

Developed in accordance with Federal State Educational Standard:

Federal State Educational Standard of higher education in the specialty 31.05.01 General medicine (Order of the Ministry of Education and Science of the Russian Federation on August 12 2020 No. 988)

Based on the Curriculum:
31.05.01 GENERAL MEDICINE
Specialization: General Medicine
Approved by the Academic Council of Surgut State University, "11" June 2026, Record No.5

The Syllabus was approved by the department
Morphology and physiology

Head of Department, Doctor of Medicine, Professor Stolyarov V.V.

1. COURSE OBJECTIVES	
1.1	To form a system of knowledge about the rules of regulation and mechanisms for regulating the vital activity of the human body at various stages of ontogenesis, taking into account external environmental factors necessary for the professional activity of a doctor.

2. COURSE OVERVIEW	
Course code (in curriculum)	Б1.О.04.11
2.1	**Assumed background:**
2.1.1	Biology
2.1.2	Human anatomy
2.2	**Post-requisite courses and practice:**
2.2.1	Homimal physiology
2.2.2	Pathophysiology
2.2.3	Human Genetics
2.2.4	Physiological Basics of Human Adaptation in the North

3. COMPETENCES UPON COMPLETION OF THE COURSE (MODULE)

GPC-5.1: Knows the histological structure of organ tissues - knows how to differentiate them microscopically; the anatomy of the human body - the macroscopic structure and topography of organs and body parts; human physiology - the mechanisms of homeostasis regulation and the functional systems of the body in the normal condition

GPC-5.9: Demonstrates knowledge of the theoretical foundations of immunology, allergology, understanding of immune defence mechanisms, types of immunological reactions and their role in the pathogenesis of human diseases

By the end of the course students must:

3.1	**Know:**
3.1.1	The patterns of ontogenesis and the stages of maturation of physiological systems of the human body.
3.1.2	Age-related and adaptive features of the central and peripheral nervous system at various stages of ontogenesis.
3.1.3	Age-related features of higher nervous activity, properties of nervous processes and information processing speed.
3.1.4	Morphofunctional features of the musculoskeletal system and the influence of physical activity on its functional state.
3.1.5	Age-related and adaptive features of the cardiovascular system and the mechanisms of its adaptation to various factors.
3.1.6	Age-related features of blood, the immune system and the respiratory system at various stages of ontogenesis.
3.1.7	Age-related and adaptive features of the digestive system, metabolism and the principles of dietary planning for different age groups.
3.1.8	Age-related and adaptive features of the excretory, reproductive and endocrine systems, including the features of endocrine regulation during puberty, peri- and postmenopause.
3.2	**be able to:**
3.2.1	Analyse the patterns of ontogenesis and interpret age-related features of the maturation of physiological systems.
3.2.2	Examine tendon reflexes and assess the motor functions of the cerebellum in laboratory work.
3.2.3	Assess the properties of nervous processes and information processing speed using instrumental methods.
3.2.4	Analyse age-related features of the musculoskeletal system and evaluate the influence of physical activity level on the functional state of the body.
3.2.5	Examine cardiovascular system parameters and interpret the features of its adaptation to various factors.
3.2.6	Interpret age-related parameters of red and white blood cells and solve situational tasks on assessing the state of the blood and immune systems.
3.2.7	Determine the main parameters of the respiratory system and interpret their age-related changes.
3.2.8	Assess age-related features of digestion and metabolism, and compile dietary plans for patients of different age groups.
3.2.9	Interpret the sex formula and assess the age-related characteristics of the reproductive and endocrine systems at various stages of ontogenesis.

4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)

Class Code	Topics /Class type	Term / Academic year	Academic hours	Competences	Literature	Inter active	Notes
	Unit 1. Ontogenesis						
1.1	Patterns of ontogenesis /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.2 L2.4L3.1		
1.2	Patterns of ontogenesis /Practice/	6	2	GPC-5.1; GPC-5.9	L1.2 L1.5L2.1L3. 1		
1.3	The patterns of ontogenesis. Maturation of human body systems /Practice/	6	2	GPC-5.1; GPC-5.9	L1.2 L2.1L3. 1		
1.4	Neural network technologies as end-toend technologies in the study of age-related features of the organism at various stages of ontogenesis. /Self-study/	6	2	GPC-5.1; GPC-5.9	L1.5L2.1L3. 1		
	Unit 2. Age-related and adaptive features of the nervous system						
2.1	Age-related and adaptive features of the nervous system at different stages of ontogenesis. Agerelated features of the central nervous system /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.2L2.4 L2.1L3.1		
2.2	Investigation of tendon reflexes. Study of motor functions of the cerebellum /Practice/	6	2	GPC-5.1; GPC-5.9	L1.2 L1.5L2.2 L2.4L3.1		
2.3	Features of regulatory processes. Systemogenesis. /Practice/	6	4	GPC-5.1; GPC-5.9	L1.5L2.1 L2.4L3.1		
2.4	Private nervous system. The possibilities of neurobiology and neurophysiology in the study of the properties of the human nervous system using information and end-to-end technologies at various stages of ontogenesis /Practice/	6	8	GPC-5.1; GPC-5.9	L1.5L2.1 L2.3L3.1		
2.5	Age-related aspects of the physiology of higher nervous activity. Age-related features of the peripheral nervous system	6	2		L1.1L2.4 L2.1L3.1		

	/Lecture/						
2.6	Physiology of higher nervous activity. Properties of nervous processes. Information processing speed /Practice/	6	2		L1.1 L1.4 L2.4 L2.1L3.1		
	Unit 3. Age-related and adaptive features of the musculoskeletal system						
3.1	Morphofunctional features of the musculoskeletal system at different stages of ontogenesis /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.1L2.1 L2.4L3.1		
3.2	Age-related features of movement and musculoskeletal system / Practice/	6	2	GPC-5.1; GPC-5.9	L1.5L2.1 L2.1L3.1		
3.3	Neural network technologies as end-toend technologies in the study of age-related features of the organism at ontogenesis various stages /Self-study/	6	4	GPC-5.1; GPC-5.9	L1.1L2.4 L2.1L3.1		
3.4	Features of the musculoskeletal system at different stages of ontogenesis. Influence of the level of motor activity on the functional state of the musculoskeletal system /Self-study/	6	2	GPC-5.1; GPC-5.9	L1.2L2.3L3.1		
	Unit 4. Age-related and adaptive features of the						
4.1	**cardiovascular system**Morphofunctional features of the cardiovascular system at different stages of ontogenesis /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.4L2.4L3.2		
4.2	Study of the properties of the cardiovascular system. Features of adaptation of the cardiovascular system to the effects of various factors /Practice/	6	2	GPC-5.1; GPC-5.9	L1.4L2.1L3. 1		
4.3	Cardiovascular system at different stages of ontogenesis /Self-study/	6	2	GPC-5.1; GPC-5.9	L1.4L2.4 L2.1L3.4		
	Unit 5. Blood. Age and adaptive features						
5.1	Age and adaptive features of blood /Lecture/	6	1	GPC-5.1; GPC-5.9	L1.4L2.1L3. 4		
5.2	Age features of white and red blood /Practice/	6	2	GPC-5.1; GPC-5.9	L1.4 L2.1L3. 4		
	Age-related features of the immune system /Selfstudy/	6	2	GPC-5.1; GPC-5.9	L1.4L2.2L3.4		

	Unit 6. Age and adaptive features of the respiratory system						
6.1	Age-related features of the respiratory system /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.4L2.4L3.4		
6.2	Methods for determining the main indicators of respiration /Practice/	6	4	GPC-5.1; GPC-5.9	L1.4L2.4L3.1		
6.3	Age-related features of the respiratory system /Self-study/	6	2	GPC-5.1; GPC-5.9	L1.1L2.3L3.2		
	Unit 7. Age-related and adaptive features of the digestive system and metabolism						
7.1	Age-related and adaptive features of the digestive system and metabolism /Lecture/	6	1	GPC-5.1; GPC-5.9	L1.4L2.4L3.2		
7.2	Age-related features of the digestive system /Practice/	6	2	GPC-5.1; GPC-5.9	L1.4L2.4L3.4		
7.3	Age-related features of metabolism. Preparation of food ration for different ages /Practice/	6	2	GPC-5.1; GPC-5.9	L1.4L2.4L3.1		
7.4	Metabolism and nutrition at different stages of ontogenesis /Self-study/	6	2	GPC-5.1; GPC-5.9	L1.4L2.1L3. 4	0	
	Unit 8. Age-related and adaptive features of the excretory and reproductive systems						
8.1	Age and adaptive features of the excretory and reproductive systems	6	2	GPC-5.1; GPC-5.9	L1.2 L1.3L2.1L3. 3		
8.2	/The sexual formulaPractice/ /Practice/	6	2	GPC-5.1; GPC-5.9	L2.1L3.1		
8.3	The use of end-to-end and information technologies for the study of age-related and adaptive properties of the respiratory system /Selfstudy/	6	2	GPC-5.1; GPC-5.9	L1.4L2.1L3. 4		
	Unit 9. Age-related and adaptive features of the endocrine system						
9.1	Age-related and adaptive features of the endocrine system /Lecture/	6	2	GPC-5.1; GPC-5.9	L1.2L2.4L3.1 L3.4		
9.2	Features of the endocrine system at different stages of ontogenesis /Practice/	6	2	GPC-5.1; GPC-5.9	L1.2 L2.4L3. 4		control work

9.3	Features of endocrine regulation during puberty, peri- and postmenopause /Selfstudy/	6	2	GPC-5.1; GPC-5.9	L1.2L2.4L3.4		
	Unit 10. Final lesson						
10.1	Credit /	6	0	GPC-5.1; GPC-5.9	L1.4L1.4L2.2 L2.4	0	Oral quiz Test

5. ASSESSMENT TOOLS

5.1. Tests and tasks

Supplement 1

5.2. Assessment tools

Supplement 1

6. COURSE (MODULE) RESOURCES

6.1. Recommended Literature

6.1.1. Core

	Authors	Title	Publish., year	Quantity
L1.1	Tyurikova G. N.	Anatomy and age physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2016, electronic resource	1
L1.2	K.V. Sudakov	Normal physiology. Textbook	Moscow: GEOTAR-Media, 2022, electronic resource	1
L1.3	Tyurikova G. N., Tyurikova Yu. B.	Anatomy and age physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2016, electronic resource	1
L1.4	Dorokhov E.V., Karpova A.V., Semiletova V.A. and others.	Normal physiology. Textbook	Moscow: GEOTAR-Media, 2025, electronic resource	1

6.1.2. Supplementary

	Authors	Title	Publish., year	Quantity
L2.1	Sapin M.R., Nikityuk D.B., Nikolenko V.N., Klochkova S.V.; Ed. M.R. Sapina, D.B. Nikityuk	Human Anatomy. Textbook in 2 vol. Part 1	Moscow: GEOTAR-Media, 2026, electronic resource	1
L2.2	Sapin M.R., Nikityuk D.B., Nikolenko V.N., Klochkova S.V.; Ed. M.R. Sapina, D.B. Nikityuk	Human Anatomy. Textbook in 2 vol. Part 2	Moscow: GEOTAR-Media, 2026, electronic resource	1
L2.3	R Aizman. I., Lysova N. F.	Age physiology and psychophysiology: Textbook	Moscow: INFRA-M Scientific	1

			Publishing Center LLC, 2014, electronic resource	
L2.4	R Aizman.I., Abaskalova N.P.	Human physiology: Textbook	Moscow: INFRA-M Scientific Publishing Center LLC, 2018, electronic resource	1

6.1.3. Methodological developments

	Authors	Title	Publish., year	Quantity
L3.1	Sai Yu. V.	Workbook on the academic discipline "Human anatomy and physiology"	Moscow: Lan, 2017, electronic resource	1
L3.2	Solodkov A.S., Sologub E.B.	Human physiology. General. Sports. Age group. - 7th edition	Moscow: Sport, 2017, electronic resource	1
L3.3	Morozkina A.V.	Human and animal physiology with the basics of higher nervous activity: methodological recommendations and tasks for laboratory classes and control works	Surgut: Publishing Center of SurSU, 2020, electronic resource	1
L3.4	Yurina M. A., Lopatskaya Zh. N.	Normal physiology: guidelines for performing laboratory work	Surgut: Publishing Center of SurGU, 2020, electronic resource	1

6.2. Internet resources

E1	Student Consultant http://www.studmedlib.ru
E2	VINITI http://www.viniti.ru/
E3	Medline http://www.medline.ru/
E4	PubMedCentral http://www.ncbi.nlm.nih.gov/pubmed/
E5	Clinical guidelines. Obstetrics and gynecology https://prof.ncagp.ru/index.php?_t8=85
E6	Russian State Library https://www.rsl.ru/en

6.3.1 Software

6.3.1.1	Microsoft Windows operating system, a Microsoft Office application package, Internet access (Wi-Fi).

6.3.2 Information Referral systems

6.3.2.1	Guarantor-information-legal portal. https://www.garant.ru/ ConsultantPlus - reliable legal support. https://www.consultant.ru/

7. MATERIAL AND TECHNICAL SUPPORT OF THE DISCIPLINE (MODULE)

7.1	The classroom for lectures, seminars (laboratory classes), group and individual consultations, ongoing assessment and interim certification is equipped with: a set of specialized educational furniture, a marker (chalk) board, a portable multimedia equipment set — computer, projector, projection screen, computers with Internet access and access to the electronic information and educational environment. Access to the Internet and the electronic information environment of the organization is provided. Information about the equipment of the classrooms is available on the university website at: Information about the educational organization — Material and technical support and provision of the educational process.