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Khanty-Mansiysk Autonomous Okrug-Ugra  
 «Surgut State University»

Approved by  
 Deputy Rector for Academic Affairs

\_\_\_\_\_ E.V. Konovalova

11 June 2026 г., Record No 5

# Biology

## Syllabus

Department	<b>Morphology and physiology</b>
Curriculum	s310501-ЛечДеЛоИИ-25-1.plx Specialty 31.05.01 General Medicine
Qualification	<b>General Practitioner</b>
Form of education	<b>Full-time</b>
Total (in credits)	<b>5</b>

Total academic hours	180
including:	
Classes	96
Self-study	48
Control	36

Control:  
 2<sup>nd</sup> term-exam  
 1<sup>st</sup> term-credit

### Course outline in terms

Academic year (Term)	1 (1.1)		2 (1.2)		Total	
	Cur	Syl	Cur	Syl	Cur	Syl
Weeks	15	3/6	17	2/6		
Lectures	16	16	16	16	32	32
Practical	32	32	32	32	64	64
Classes total	48	48	48	48	96	96
Contact training	48	48	48	48	96	96
Self-study	24	24	24	24	48	48
Control			36	36	36	36
Total	72	72	108	108	180	180

The Syllabus is compiled by:

*PhD in Biological Sciences, Associate Professor, Soltys T. V., lecture Maksimova Anna Sergeevna*

The Syllabus

**Biology**

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. №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 г., 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	The purpose of studying the discipline "Biology" is the formation of students' systemic fundamental knowledge, skills and abilities of the greatest interest for practical healthcare, in preparing students for the systematic perception of general medical, social and clinical disciplines and the formation of their natural science worldview and the logic of biological thinking necessary for the subsequent practical activity of a doctor.
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**2. COURSE OVERVIEW**

Course code (in curriculum):	B1.O.04
<b>2.1 Assumed background:</b>	
2.1.1	Biology (school course). Be able to: analyze biological phenomena and patterns of natural processes.
2.1.2	Have skills of: working with a microscope, models, macro-and micro-preparations of animals; working with literature in biology, lecture notes and the theoretical part of practical classes.
<b>2.2 Post-requisite courses and practice:</b>	
2.2.1	Histology, Embryology, Cytology
2.2.2	Biochemistry
2.2.3	Hominal Physiology
2.2.4	Microbiology, Virology
2.2.5	Neurology, Medical Genetics, Neurosurgery
2.2.6	Internal Diseases Propaedeutics
2.2.7	Paediatrics, Childhood Infections
2.2.8	Obstetrics

**3. COMPETENCES UPON COMPLETION OF THE COURSE (MODULE)**

**GPC-5.2: Knows the structure of the cell, the phases of its division, the theoretical principles of genetics and the biology of insects and helminths, their role in the etiology of human diseases**

**GPC-5.5: Demonstrates knowledge of the structure, physiology of microorganisms, their etiological role in human diseases based on the subject «microbiology»**

**By the end of the course students must**

<b>3.1 know:</b>	
3.1.1	Safety regulations and work in biological laboratories with reagents, devices, animals
3.1.2	General laws of the origin and development of life, the structure of the cell, the phases of its division, human anthropogenesis and ontogenesis; theoretical foundations of genetics, its significance for medicine, the laws of heredity and variability in individual development as the basis for understanding the pathogenesis and etiology of hereditary and multifactorial human diseases; basic concepts and problems of the biosphere and ecology, the phenomenon of parasitism, understanding of the biology of insects and helminths, their role in the etiology of human diseases; features of the organizational and population levels of the organization of life
<b>3.2 be able to:</b>	
3.2.1	Use educational, scientific, popular science literature, the Internet for professional activities; use biological equipment; work with magnifying equipment (microscopes, optical and simple magnifiers); make calculations based on the results of the experiment, to carry out elementary statistical processing of experimental data; explain the nature of deviations in the course of development that can lead to the formation of variants of anomalies and defects; describe the morphological changes of the studied macroscopic, microscopic preparations and electronograms; diagnose the pathogens of human parasitic diseases on the drug, slide, and photo.

**4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)**

Class Code	Topics /Class type	Term / Academic year	Academic hours	Competences	Literature	Notes
	<b>Module 1. Introduction. The device of a light microscope and the technique of microscopy. Cellular level of life organization</b>					
1.1	Cell biology. The cellular level of the organization of life /Lecture/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	

1.2	The structural and functional organization of the hereditary material and its implementation into a trait. The structural organization of the core. Spatial arrangement of chromosomes. The role of nuclear structures in the vital activity of the cell. The mechanism of mutagenesis. Replication. The mechanism of repair /Lecture/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.3	The device of a light microscope and the technique of microscopy. The cellular level of the organization of biological systems. Structure and functions of organelles /Practice/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.4	Cell membranes. Vesicular transport /Practice/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.5	Cytoskeleton and structural proteins, intracellular transport, signaling and adhesion. Mitochondria and energy metabolism. Cellular respiration /Practice/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.6	Reproduction at the cellular level. Cell cycle, mitosis, apoptosis, the mechanism of cell death. Levels of regulation of gene expression. Transcription. Broadcast /Practice/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.7	Colloquium on the topic: "The cellular level of the organization of life" /Practice/	1	2	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
1.8	Preparation for an oral quiz, tests /Self-study /	1	8	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	
	<b>Module 2. Organism(ontogenetic) level of biological system organization</b>					
2.1	Developmental biology. Prenatal ontogenesis /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.2	Developmental biology. Postnatal ontogenesis /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.3	Regulation of ontogenesis /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.4	Homeostasis /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.5	Ontogenesis. General regularities of progenesis, embryogenesis, postembryonic period of ontogenesis /Practice/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.6	Regulation of ontogenesis /Practice/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.7	Colloquium on the topic: "The main patterns of individual development". "Homeostasis" /Practice/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
2.8	Preparation for an oral quiz, tests /Self-study /	1	8	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
	<b>Module 3. Population-specific level of living systems organization. Questions of evolution</b>					
3.1	The evolutionary doctrine /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
3.2	Evolution of Organ Systems /Lecture/	1	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
3.3	The evolutionary doctrine. Man as an object of the action of evolutionary factors. The evolution of the musculoskeletal system. Phylogenetically determined defects of the	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	

	musculoskeletal system /Practice/					
3.4	The evolution of the digestive system. Phylogenetically determined defects of the digestive system /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.5	The evolution of the respiratory system. Phylogenetically determined defects of the respiratory system /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.6	The evolution of the circulatory system. Phylogenetically determined heart and vascular defects /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.7	Evolution of the excretory system. Phylogenetically determined defects of the excretory system /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.8	The evolution of integration systems: nervous, endocrine. Phylogenetically determined defects of integration systems /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.9	Colloquium on the topic: "Evolution of organ systems" /Practice/	1	2	GPC-5.2	L1.1 L1.2 E1 E2 E3 E4 E5	
3.10	Final lesson /Practice/	1	2	GPC-5.2	L1.1 L1.2 L2.1 L2.2 E1 E2 E3 E4 E5	
3.11	Control work	1	0	GPC-5.2	L1.1 L1.2 L2.1 L2.2 E1 E2 E3 E4 E5	presentation of Essays
3.12	Preparation for an oral quiz, tests. Writing Essays /Self- study /	1	8	GPC-5.2	L1.1 L1.2 L2.1 L2.2 E1 E2 E3 E4 E5	
3.13	Credit	1	0	GPC-5.2	L1.1 L1.2 L2.1 L2.2 E1 E2 E3 E4 E5	
	<b>Module 4. Human genetics and anthropogenesis</b>					
4.1	Human genetics and anthropogenesis /Lecture/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
4.2	Human genetics. The role of genetic factors and the environment in the formation of the phenotype. Genotype - an evolutionarily developed system of genes /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
4.3	Concatenated inheritance. Genetics of sex. Gender-linked inheritance /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
4.4	Variability and its forms /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
4.5	Anthropogenesis /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
	<b>Module 5. Biogeocenotic and biospheric levels of biological systems organization</b>					
5.1	Ecology. General ecology. The main sections. General characteristics of the ecological system. Environmental factors. Endo -, out -, dem -, synecology/ Human Ecology. The doctrine of the biosphere /Lecture/	2	4	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
5.2	General ecology, human ecology, medical ecology /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
5.3	Colloquium on the topic: "Human genetics. Anthropogenesis. Ecology" /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
	<b>Module 6. General and medical parasitology</b>					
6.1	Parasitism as an ecological phenomenon.	2	2	GPC-5.2	L1.1 L2.1	

	Human parasitic diseases /Lecture/				E1 E2 E3 E4 E5	
6.2	General and Medical protozoology /Lecture/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
6.3	Fundamentals of medical protozoology. The Sarcodes class. Flagellate class /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
6.4	The Sporoviki class. Infusoria Class /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
	Module 7. General and Medical Helminthology				L1.1 L2.1 E1 E2 E3 E4 E5	
7.1	General and medical helminthology /Lecture/	2	4	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
7.2	Basic concepts of helminthology. Species Flatworms. Class Flukes. System organization and morphology. Life cycle /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
7.3	Basic concepts of helminthology. Species Flatworms. Class Tapeworms. System organization and morphology. Life cycle /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
7.4	Roundworms. Class Actually round. System organization and morphology /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
7.5	Species Ringed Worms. Class Leech /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
	<b>Module 8. General and medical arachnoentomology</b>					
8.1	General and medical arachno- entomology /Lecture/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.2	Type Arthropods. Subtype Toad. Class Crustaceans /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.3	Type Arthropods. Subtype Helicer. Spider-like class /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.4	Type Arthropods. Subtype Tracheus. Insect Class /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.5	Colloquium on the topic: " Fundamentals of medical parasitology" /Practice/	2	2	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.6	Preparation for an oral quiz, tests. Solving situational problems. Writing Essays /Self-study /	2	24	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.7	Control work /Control/	2	0	GPC-5.2	L1.1 L2.1 E1 E2 E3 E4 E5	
8.8	Exam /Exam/	2	36	GPC-5.2 GPC-5.5	L1.1 L2.1 E1 E2 E3 E4 E5	

## 5. ASSESSMENT TOOLS

### 5.1. Assessment tools

Presented by a single document

### 5.2. Assessment tools for diagnostic assessment

Presented by a single document

## 6. COURSE (MODULE) RESOURCES

### 6.1. Recommended Literature

#### 6.1.1. Core

	Authors	Title	Publish, year	Quantity
L1.1	Fullick Ann	A Level Biology A for OCR Year 1 Student Book	Oxford University Press, 2015	31

L1.2	Fuller Fran	Level Advancing Biology for OCR Year 2 Student Book	Oxford University Press, 2015	31
<b>6.1.2. Supplementary</b>				
	Authors	Title	Publisher, year	Quant
L2.1	Polyakova T. I., Sukhov I. B.	Cell Biology: Textbook	St. Petersburg: St. Petersburg Medical and Social Institute, 2015, electronic resource	1
L2.2	Dondua A. K.	Developmental Biology: Textbook	St. Petersburg State University Publishing House, 2018, electronic resource	1
<b>6.2. Internet resources</b>				
E1	Central Scientific Medical Library (CSML), <a href="http://www.scsm.l.rssi.ru">http://www.scsm.l.rssi.ru</a>			
E2	Scientific and Medical Library of the Siberian State Medical University, <a href="http://medlib.tomsk.ru">http://medlib.tomsk.ru</a>			
E3	FreeMedicalJournals, <a href="http://www.freemedicaljournals.com">http://www.freemedicaljournals.com</a>			
E4	BMN, <a href="http://www.bmn.com">http://www.bmn.com</a>			
E5	The largest abstract and citation database of peer-reviewed literature, <a href="http://www.scopus.com/">http://www.scopus.com/</a>			
<b>6.3.1 Software</b>				
6.3.1.1	Application Software Package Microsoft Office			
<b>6.3.2 Information Referral systems</b>				
6.3.2.1	Information and legal portal Garant.ru <a href="http://www.garant.ru">http://www.garant.ru</a>			
6.3.2.2	Legal reference system Consultant Plus <a href="http://www.consultant.ru">http://www.consultant.ru</a>			
<b>7. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE (MODULE)</b>				
7.1	The classroom for practical classes, group and individual consultations, current and intermediate control, for independent work is equipped with a blackboard, a portable projector, a computer, an interactive whiteboard, microscopes, racks with visual aids, standard furniture for the teacher (table, chair), standard furniture for students (educational tables and chairs for 18 seats), visual aids, micro-preparations.			