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

Approved by  
 Deputy Rector for Academic Affairs

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

“ 13 ” June 2024, Record No. 5

# Biomedical Technology

## Syllabus

Department **Pathologic Physiology and General Pathology**

Curriculum s310501- LechDeloIn -24-5.plx  
 Specialty: 31.05.01 General Medicine  
 Specialization: Medicine

Qualification **General Practitioner**

Form of education **Full-time**

Total (in credits) **2**

Total academic hours	72	Total academic hours:
including:		Credit 10term
Contact	48	
Self-study	24	

### Course outline in terms

Academic year (Term)	10 (5.2)		Total	
	16 4/6			
Types of classes	Cur	Syl	Cur	Syl
Practical	48	48	48	48
Total Aud.	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:

The Syllabus

## **Biomedical Technology**

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 February 9, 2016 No. 95)

Based on the Curriculum:

31.05.01 GENERAL MEDICINE

Specialization: General Medicine

Approved by the Academic Council of Surgut State University, , “ 13 ”   june   2024, Record No. 5

The Syllabus was approved by the department

**Pathophysiology and General Pathology**

April “19” 2024, Record No 11.

Head of Department, Doctor of Medicine, Professor Kovalenko L.V.

1. COURSE OBJECTIVES	
1.1	The aim of the course "Biomedical technologies" is to study the main directions of biomedical technologies, such as molecular genetic diagnostics, gene and cell therapy, transplantology, the use of biocompatible materials.
1.2	The course is based on the generalization of the studied material using the achievements of medicine, biology, genetics, immunology, chemistry and physics, laboratory research methods.

2. COURSE OVERVIEW	
Course code (in curriculum)	ФТД.В
<b>2.1</b>	<b>Assumed background knowledge:</b>
	Biochemistry
	Chemistry
	Biology
	Microbiology, Virology
	Nominal Physiology
	Pathophysiology
	Clinical Pathophysiology
<b>2.2</b>	<b>Дисциплины и практики, для которых освоение данной дисциплины (модуля) необходимо как предшествующее:</b>
	Clinical Pharmacology
	Anaesthesiology, Resuscitation, Intensive Care
	Medical Rehabilitation
	Oncology, X-Ray Therapy
	Instrumental Methods of Examination
	Functional Diagnostics
	Endovascular diagnostics (adaptive course)
	Practical Obstetrics and Gynaecology
	Clinical Surgery

3. КОМПЕТЕНЦИИ ОБУЧАЮЩЕГОСЯ, ФОРМИРУЕМЫЕ В РЕЗУЛЬТАТЕ ОСВОЕНИЯ ДИСЦИПЛИНЫ (МОДУЛЯ)
<b>GC-1.</b> The ability to abstract thinking, analysis and synthesis
<b>GPC-9.</b> Able to implement the principles of quality management in professional activities
<b>PC-8.</b> Capable of maintaining medical records and organizing the activities of medical staff
<b>PC-10.</b> Capable of participating in the introduction of new methods and techniques aimed at protecting the health of citizens

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

<b>3.1</b>	<b>know:</b>
3.1.1	theoretical foundations of biomedical technologies and their practical use in various branches of the medical sciences (human genetics, immunology, transplantology, pharmacology, cardiology, reproductology); the evolution of biomedical technology and its foreseeable prospects; have an idea about cell technologies, stem cells, bioethical aspects.
<b>3.2</b>	<b>be able to:</b>
3.2.1	design primers for PCR, use genetic online databases; use modern computer equipment and software for the design and analysis of the results of molecular genetic studies.

4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)						
Class Code	Topics /Class type	Term / Academic	Academic hours	Competences	Literature	Interactive
	<b>Раздел 1. Section 1. General</b>					
1.1	The subject of biomedicine as a stage in the development of ideas about living systems, the evolution of biomedical technologies, the relationship with other subjects. The evolution of biomedical technology, the main achievements /Pr/	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	

1.2	The subject of biomedicine as a stage in the development of ideas about living systems, the evolution of biomedical technologies, the relationship with other subjects. The evolution of biomedical technology, the main achievements /Ss/	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.3	Biomedical technologies in the pharmaceutical industry (development of biological products, methods of targeted delivery) /Pr/	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.4	Biomedical technologies in the pharmaceutical industry (development of biological products, methods of targeted delivery) / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.5	Methods of molecular analysis of the genome, proteome; genetic diagnostics; PCR, sequencing / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.6	Methods of molecular analysis of the genome, proteome; genetic diagnostics; PCR, sequencing / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.7	Biomedical technologies in translational medicine: biomarkers, gene therapy, cell therapy, bioprinting / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.8	Biomedical technologies in translational medicine: biomarkers, gene therapy, cell therapy, bioprinting / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.9	Use of biomedical technologies in the diagnostics and treatment of cardiovascular diseases; reproductive health / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.10	Use of biomedical technologies in the diagnostics and treatment of cardiovascular diseases; reproductive health / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.11	Use of polymeric biomaterials and electronics in biomedicine / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.12	Use of polymeric biomaterials and electronics in biomedicine / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.13	The role of IT in biomedical technologies: bioinformatics and big data analysis / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.14	The role of IT in biomedical technologies: bioinformatics and big data analysis / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.15	Biomedical technologies in regenerative medicine; therapeutic and reproductive cloning / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.16	Biomedical technologies in regenerative medicine; therapeutic and reproductive cloning / Ss /	10	2	GC-1 GPC-9 PC-8.	L 1.1 E1 E2 E3 E4	

1.17	Modern approaches in biobanking / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.18	Modern approaches in biobanking / Ss/	10	2	GC-1 GPC-9 PC-8.	L 1.1 E1 E2 E3 E4	
1.19	Biomedical technologies: Neurointerface Perspectives / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.20	Biomedical technologies: Neurointerface Perspectives / Ss /	10	1	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.21	Ethical aspects and legal regulation of biomedical technologies / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.22	Ethical aspects and legal regulation of biomedical technologies / Ss /	10	2	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.23	Final lesson / Pr /	10	4	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.24	Final lesson / Ss/	10	3	GC-1 GPC-9 PC-8.	L 1.1 E1 E2 E3 E4	
1.25	control work	10	0	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	
1.26	Credit	10	0	GC-1 GPC-9 PC-8. PC-10.	L 1.1 E1 E2 E3 E4	

## 5. ОЦЕНОЧНЫЕ СРЕДСТВА

### 5.1. Оценочные материалы для текущего контроля и промежуточной аттестации

Submitted in a separate document

### 5.2. Оценочные материалы для диагностического тестирования

Submitted in a separate document

## 6. COURSE (MODULE) RESOURCES

### 6.1. Recommended Literature

#### 6.1.1. Core

	Authors	Title	Publisher, year	Quantity
L 1.1	/ Levchuk I.P.	Life Safety in Medicine	ГЭОТАР-Медиа, 2018. Electronic resource	1

#### 6.1.2. Supplementary

	Authors	Title	Publisher, year	Quantity

### 6.2. Internet resources

E1	FreeMedicalJournals			
E2	HighWire			
E3	Molecular & Cellular Proteomics			

E4	Medline
<b>6.3.1 Перечень программного обеспечения</b>	
6.3.1.1	Operational system Microsoft, applied programs pack Microsoft Office
<b>6.3.2 Перечень информационных справочных систем</b>	
6.3.2.1	"Garant", "Consultant"

#### **7. МАТЕРИАЛЬНО-ТЕХНИЧЕСКОЕ ОБЕСПЕЧЕНИЕ ДИСЦИПЛИНЫ (МОДУЛЯ)**

The classroom for lectures, seminars (laboratory classes), group and individual consultations, current control and interim certification is equipped with: a set of specialized furniture, marker (chalk) board, a set of portable multimedia equipment - 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