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Federal State Budget Educational Institution
of Higher Education
Pacific State Medical University
of the Ministry of Health of the Russian Federation

APPROVED BY
First Vice-Rector

_____ / Trankovskaya L.V./
"9" июня 2025

DISCIPLINE WORK PROGRAM

Б1.О.07 Chemistry

(name of discipline)

Specialty	**31.05.01 General Medicine for international students (in English)** (code, name)
Degree	Specialist's degree
Profile	02 "Healthcare" (in the field of providing primary health care to the population in medical organizations: polyclinics, outpatient clinics, inpatient/outpatient facilities of the municipal health care system)
Mode of study	Full-time
Period of mastering the BEP	**6 years** (nominal length of study)
Institute	of Fundamentals and Information Technologies in Medicine

Vladivostok, 2025

Program of the discipline **Б1.О.07 Chemistry** is based on:
1) Federal State Educational Standard of Higher Education for the specialty approved by the Order No. 988 of Ministry of Science and Higher Education of the Russian Federation dated August 12, 2020.

2) Curriculum for the 31.05.01 General Medicine for international students (in English), profile 02 "Healthcare" (in the field of providing primary health care to the population in medical organizations: polyclinics, outpatient clinics, inpatient/outpatient facilities of the municipal health care system), approved by the Academic Council of FSBEI HE PSMU of the Ministry of Health of Russia, Report No. 8/24-25 dated March 31, 2025.

Work program for the discipline was developed by the writing team of the Institute of Fundamentals and Information Technologies in Medicine of the FSBEI HE PSMU of the Ministry of Health of Russia, under the guidance of the director of the institute Candidate of Biological Sciences Startseva M.S.

Developed by:

Assistant Professor	Candidate of Biological Sciences	Shevchenko O.V.
(position held)	(academic degree, academic title)	(full name)

1. GENERAL PROVISIONS

1.1. Purpose and Objectives of Mastering Б1.О.07 Chemistry

The purpose of mastering the discipline is to acquire systemic knowledge about the chemical and biological essence of processes occurring in the body at the cellular and molecular levels involving organic and inorganic substances, as well as the ability to calculate the parameters of these processes using physico-chemical and mathematical apparatus.

Objectives of mastering the discipline:

1. Developing the ability to identify patterns of chemical and biological processes in terms of their competition, resulting from the combination of different types of equilibria.
2. Learning how to choose optimal physico-chemical methods of analysis in medicine.
3. Internalizing the rules of safe operation in a chemical laboratory and monitoring compliance with and ensuring environmental safety when working with reagents.

2. DISCIPLINE AS PART OF THE BASIC EDUCATIONAL PROGRAM

Discipline **Б1.О.07 Chemistry** is included in the Mandatory part of the Unit 1 of the basic educational program for the specialty 31.05.01 General Medicine for international students (in English), profile 02 "Healthcare" (in the field of providing primary health care to the population in medical organizations: polyclinics, outpatient clinics, inpatient/outpatient facilities of the municipal health care system), and is part of the 1st semester's curriculum.

3. PLANNED LEARNING OUTCOMES OF THE DISCIPLINE

3.1. Mastering the discipline **Б1.О.07 Chemistry** is aimed at the development of students' competencies. The discipline facilitates the development of students' competencies corresponding to the types of professional activity.

Name of competency category (group) / Labor function	**Code and Name of competency of the graduate**	**Competency Indicators**
General Professional Competencies		
Etiology and pathogenesis	GPC-5. Is able to assess morphofunctional status, physiological states, and pathological processes in the human body when working to achieve objectives of professional activity	CI.GPC-5_2- distinguishes between pathological and physiological processes, identifies etiology of changes
Professional Competencies		
A/02.7 Examination of the patient in order to make a diagnosis	PC-3 Ability and readiness to collect and analyze complaints that a patient presents with, anamnestic data, examination results, results of laboratory and instrumental tests, biopsy and other studies in order to identify patient's condition or establish the presence or absence of a disease	CI.PC-3_3- selects required additional diagnostic methods, evaluates their results in order to recognize patient's condition, establish the presence or absence of the disease

3.2. Types of professional activity corresponding to competencies developed over the course of mastering **Б1.О.07 Chemistry**:

Types of professional activity objectives

1. Medical

Kinds of professional activity objectives

1. diagnostics

3.3. Planned learning outcomes of mastering the discipline are represented by knowledge, skills, abilities and/or experience, characterize the stages of developing competencies and ensure achievement of the planned outcomes of mastering the basic educational program. Learning outcomes of a discipline are correlated with competency indicators.

4. SCOPE AND CONTENT OF THE DISCIPLINE

4.1. Scope of the Discipline and Types of Academic Work

Type of Academic Work		**Total Hours**	**Semesters**
			1
			hours
1		2	3
Classroom hours (total), including:		**86**	**86**
Lectures (L)		22	22
Practical classes (C)		64	64
Independent work of the student (IW), including:		**58**	**58**
Preparing for classes (CP)		24	24
Preparing for continuous assessment (CAP)		14	14
Preparation for interim assessment (IAP)		20	20
Interim assessment			
Type of interim assessment	pass/fail test (T)	GT (Graded test)	GT
	exam (E)		
TOTAL: TOTAL credit value	hrs.	**144**	**144**
	credits	**4**	**4**

4.2. Contents of the Discipline

4.2.1. Topics of Discipline Lectures and Academic Hours per Semester

No.	**Lecture Topic**	**Hours**
1	2	3
	Semester No. 1	
1.	Protolytic theory of acids and bases. Protolytic equilibrium. Buffer solutions	2
2.	Ligand-exchange and heterogeneous equilibria and vital processes	2
3.	Redox equilibria and processes	2
4.	Basic concepts of thermodynamics. The first and second principles of thermodynamics. Chemical equilibrium	2
5.	Chemical kinetics. The molecularity and order of the reaction. Factors affecting speed	2
6.	Adsorption equilibria and processes at mobile and stationary phase interfaces. Factors affecting the adsorption capacity	2
7.	Stability of colloidal solutions. The phenomena of coagulation, colloidal	2

	protection, peptization	
8.	Heterofunctional organic compounds (hydroxy-, oxo-, amino acids). Stereoisomerism. Properties, biological role	2
9.	Carbohydrates: mono-, di-, polysaccharides. Structure, properties, biological role	2
10.	Heterocyclic compounds. Nucleic acids. Structure, properties, biological role	2
11.	Lipids	2
	Hours per semester total	**22**

4.2.2. Topics of Discipline Practical Classes and Academic Hours per Semester

No.	Practical Class Topic	Hours
1	2	3
	Semester No. 1	
1	Methods of expressing the concentration of solutions. Laboratory class "Preparation of a solution of a given concentration"	4
2	Determination of the concentration of the solution. Laboratory class "Determination of active acidity (AA), titratable acidity (TA), and potential acidity (PA) of Biofluid"	4
3	Properties of buffer solutions. Laboratory class "Determination of buffer capacity"	4
4	The study of redox equilibria and processes. Assessment on module No. 1 "Main types of chemical reactions and processes in the functioning of living systems"	4
5	Elements of chemical thermodynamics. Laboratory class "Determination of the enthalpy of salt dissolution"	4
6	Chemical kinetics. Laboratory class "Studying the influence of various factors on the rate of a chemical reaction"	4
7	Chemical equilibrium. Assessment on module No. 2 "Elements of chemical thermodynamics. Elements of chemical kinetics"	4
8	Adsorption. Laboratory class "Qualitative experiments on adsorption. Thin-layer chromatography"	4
9	Preparation and purification of colloidal solutions	4
10	Properties of colloidal solutions. Laboratory class "Determination of the coagulation threshold. Colloidal protection"	4
11	Properties of solutions of HMW compounds. Laboratory class "Determination of the Isoelectric Point (pI) of gelatin using the viscometric method". Assessment on module No. 3 "Surface phenomena. Adsorption. Colloidal solutions. High molecular weight compounds"	4
12	Heterofunctional organic compounds (hydroxy-, oxo-, amino acids). Stereoisomerism. Properties, biological role. Peptides, Proteins	4
13	Carbohydrates: mono-, di-, polysaccharides. Structure, properties, and biological role	4
14	Heterocyclic compounds. Nucleic acids. Structure, properties, and biological role	4
15	Saponifiable and unsaponifiable lipids. Assessment on module No. 4"Organic chemistry"	4
16	Interim examination	4
	Hours per semester total	**64**

4.2.3. Independent Work of the Student

No.	Name of the Discipline Section	Type of IW	Total Hours
1	3	4	5
	Semester No. 1		

1	Main types of chemical reactions and processes in the functioning of living systems	Preparing for practical classes, preparing for continuous assessment, preparing for tests, writing a library-research paper, preparing a report, preparing for the assessment on the module	14
2	Elements of chemical thermodynamics. Elements of chemical kinetics	Preparing for practical classes, preparing for continuous assessment, preparing for tests, writing a library-research paper, preparing a report, preparing for the assessment on the module	12
3	Surface phenomena. Adsorption. Colloidal solutions. High molecular weight compounds	Preparing for practical classes, preparing for continuous assessment, preparing for tests, writing a library-research paper, preparing a report, preparing for the assessment on the module	14
4	Organic chemistry	Preparing for practical classes, preparing for continuous assessment, preparing for tests, writing a library-research paper, preparing a report, preparing for the assessment on the module	18
	Hours per semester total		**58**

5. REQUIREMENTS FOR IMPLEMENTATION OF DISCIPLINE

5.1. Discipline Requirements for Educational Materials and Provided Information

Essential reading

No.	Name/Title, Resource Type	Author(s)/Editor	Publisher Imprint, Web Address	Number of Copies (accesses) in the Library and Information Center
1	**2**	**3**	**4**	**5**
1	Analytical Chemistry. Analytics 1. General Theoretical Foundations. Qualitative Analysis : textbook	Kharitonov, Yu. Ya	GEOTAR-Media, 2021. - 602, [6] p.	1
2	Organic chemistry : textbook	N. A. Tyukavkina, V. L. Beloborodov, S. E. Zurabyan [et al.]	GEOTAR-Media, 2022. - 592 p.	1
3	Essential Biochemistry : for medical students with problem-solving exercises : textbook	A. I. Glukhov, A. E. Gubareva	GEOTAR-Media, 2020. - 583 p.	2

Supplementary reading

No.	Name/Title, Resource Type	Author(s)/Editor	Publisher Imprint, Web Address	Number of Copies (accesses) in the Library and Information Center
1	**2**	**3**	**4**	**5**

1	Principles of medical biochemistry : tutorial on biochemistry for foreign students of medical department of higher education institutions	V. V. Davydov, E. R. Grabovetskaya	Eco-Vector LLC, 2016. - 551 p.	1
2	Biochemistry with exercises and tasks : textbook	A. I. Glukhov, V. V. Garin	GEOTAR-Media, 2020. - 293 p.	1

Online resources

1. Electronic library system "Student Consultant" http://studmedlib.ru/
2. Electronic library system "University Library Online"http://www.biblioclub.ru/
3. Electronic library system "Urait" https://urait.ru/
4. Electronic library system "BookUp" https://www.books-up.ru/
5. Resources owned by the Library and Information Center of FSBEI HE PSMU of the Ministry of Health of Russia https://tgmu.ru/university/bibliotechno-informacionnyj-centr/resursy-bic/sobstvennye/

Online resources and respective user guides are available on the Library and Information Center website Library and Information Center — PSMU (tgmu.ru)

5.2. Discipline Requirements for Facilities and Resources

Information on the facility and resource availability and requirements of the discipline is available on the Facility and resource availability and requirements. FSBEI HE PSMU of the Ministry of Health of Russia (tgmu.ru)" page of the official website of the university.

5.3. List of Information Technologies, Information and Reference Systems, Licensed and Free Software (Including Domestically-developed Software):

1. PolycomTelepresence M100 Desktop Conferencing Application (Videoconference system)
2. SunRav Software tTester
3. 7-PDF Split & Merge
4. ABBYYFineReader
5. Kaspersky Endpoint Security
6. INDIGO online testing system
7. Microsoft Windows 7
8. Microsoft Office Pro Plus 2013
9. 1C:University
10. GARANT system
11. MOODLE (Modular Object-Oriented Dynamic Learning Environment)

6. ASPECTS OF THE IMPLEMENTATION OF THE DISCIPLINE FOR STUDENTS WITH DISABILITIES AND SPECIAL NEEDS

6.1. Availability of Accessible Environment

For students with disabilities and special needs, if a written application is submitted, lectures and practical classes are carried out taking into account health limitations, individual capabilities and medical status (hereinafter referred to as individual characteristics) of the student. Compliance with the following general requirements is ensured: teaching aids for collective and individual use are provided, required technical assistance is provided by an assistant; buildings and premises where lectures and practical classes are taking place meet accessibility requirements, other arrangements lack of which makes it impossible or difficult to master the discipline are made.

6.2. Ensuring Compliance with General Requirements

When lectures and practical classes are carried out at the written application of the student, the following general requirements are met: lectures and practical classes for students with disabilities and special needs take place at the same location as for students who do not have disabilities, if this does not cause difficulties for students; an assistant (assistants), who provide(s) students with the necessary technical assistance taking into account individual characteristics of the student, is (are) provided; necessary teaching aids are provided, taking into account individual characteristics of the student.

6.3. Availability of the Internal Policies and Procedures of FSBEI HE PSMU of the Ministry of Health of Russia to Students with Disabilities in a Format Accessible to Them.

All internal policies and procedures of FSBEI HE PSMU of the Ministry of Health of Russia concerning the discipline are made available to students with disabilities in a format accessible to them.

6.4. Increase in the Time Limit of Interim Assessment for Students with Disabilities and Special Needs in Relation to the Established duration

Format of the interim assessment of academic performance within the scope of the discipline conducted for students with disabilities and special needs is selected taking into account individual characteristics of the students (orally, by writing on paper, by typing on a computer, as a test, etc.). The duration of the interim assessment in relation to the established duration is increased at the written application of the student with disabilities. Time limit for the student's preparation for the test is increased by at least 0.5 hours.

7. STAFFING REQUIREMENTS OF THE DISCIPLINE

Academic teaching personnel that ensure the implementation of the discipline education process meet the requirements of the Federal State Educational Standard of Higher Education for the 31.05.01 General Medicine for international students (in English) specialty; list of the aforementioned personnel is available on the website of the educational organization.

8. TUTORIAL WORK

Type of tutorial work	Forms and approaches to tutorial work	Assessment criteria
Assistance in personal growth	Overt Discipline Б1.О.07 Chemistry Talks and problem-centric debates aimed at promotion of healthy lifestyle. Participation in interdepartmental conferences aimed at formation of healthy lifestyle and development of skills necessary to preserve and improve health.	Portfolio
	Covert – creating atmosphere and infrastructure. Discipline Б1.О.07 Chemistry Developing a culture of healthy lifestyle, the ability to	

	preserve and improve health. Creating atmosphere of kindness and respect with a high level of communication during implementation of the discipline.	
Civic position and values	Overt Discipline Б1.О.07 Chemistry Conducting events that facilitate development of civil culture (roundtable discussions, discussions/debates, and talks). Short discussions on current significant events in case the latter occur.	Portfolio
	Covert Discipline Б1.О.07 Chemistry Focusing on civic values-oriented position and legal awareness. Cultivating mindful social position during professional activity.	
Social values	Overt Discipline Б1.О.07 Chemistry Highlighting aspects of organization of healthy lifestyle based on health-preserving technologies. Highlighting ecology-related questions, environmental issues as a factor affecting population health and select population risks.	Portfolio
	Covert Discipline Б1.О.07 Chemistry Identification in social structure during period of education and in professional activity.	