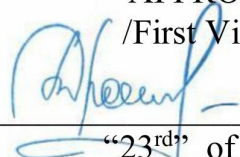


Документ подписан простой электронной подписью
Информация о владельце:
ФИО: Стегний Кирилл Владимирович
Должность: И.о. ректора
Дата подписания: 25.09.2026 05:37:42
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**Federal State Budgetary Educational Institution of Higher Education
"Pacific State Medical University"
Ministry of Health of the Russian Federation**

APPROVED BY

/First Vice-Rector

 / Dvoynikova E.R./
"23rd" of June 2026

THE COURSE (MODULE) PROGRAM

B1.C.08 BIOLOGICAL CHEMISTRY -| BIOCHEMISTRY OF THE ORAL CAVITY

(name of the discipline (module))

Specialty

31.05.03 Dentistry
for training foreign students

Degree Level

Specialist Degree

Specialization

02 Healthcare
(in the field of dental care)

Mode of Study

Full-time

Duration of the CEP

5 years

Institute/Department

Institute of Fundamental Foundations and
Information Technologies in Medicine

Vladivostok, 2026

The work program of the discipline (module) B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity is based on:

- 1) Federal State Educational Standard of Higher Education in the field of study (specialty) 31.05.03 Dentistry, approved by the Ministry of Higher Education and Science of the Russian Federation on August 12, 2020, No. 984.
- 2) Curriculum for the 31.05.03 Dentistry for foreign students (English-language program), profile 02 "Healthcare" (in the field of providing health care in patients with dental pathology), approved by the Academic Council of FSBEI HE PSMU of the Ministry of Health of Russia Report No. 1-7/25-26 dated March 27, 2026.

The work program of the discipline was developed by the author team of the Institute of Fundamental Foundations and Information Technologies in Medicine of the Pacific State Medical University of the Ministry of Health of Russia under the guidance of the Director of IFOITM, Candidate of Biological Sciences, Associate Professor M.S. Startseva.

Developers:

Associate Professor	PhD, biological sciences, Associate	
(Position)	Professor	Artyukova O.A.
	(Academic Degree, Academic	(Full Name)
	Title)	

1. GENERAL PROVISIONS

1.1. Purpose and Objectives of the Discipline (Module) B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity

The purpose of mastering the discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity is to acquire knowledge about the structure, properties, and functions of biomolecules and the main metabolic pathways of their transformations, which determine the state of health and adaptation of the organism under normal conditions and during the development of pathologies. In accordance with the ultimate goals of training students in the specialty 31.05.03 Dentistry, the program includes specialized issues reflecting the relationship between biochemical processes occurring in the body and the state of tissues and secretions of the oral cavity, with applications primarily in the practice of prevention, treatment, and diagnosis of dental diseases.

Objectives of mastering the discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity:

1. Formation of systematic knowledge about the chemical structure of the main substances of the body and the molecular foundations of biochemical processes underlying life activities.
2. Assimilation of the main patterns of metabolic processes, regulation of metabolism, and its relationship with the functional activity of tissues and organs of the oral cavity.
3. Training in understanding the molecular mechanisms of the development of pathological processes in the oral cavity.
4. Formation of knowledge about biochemical research methods and the ability to use their results to assess human health, diagnose diseases, and predict and verify the effectiveness of treatment.

2. PLACE OF THE DISCIPLINE (MODULE) IN THE STRUCTURE OF THE MAIN EDUCATIONAL PROGRAM

The discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity is part of the mandatory main educational program in the field of study/specialty 31.05.03 Dentistry and is studied in the 2nd and 3rd semesters.

3. PLANNED LEARNING OUTCOMES OF THE DISCIPLINE

3.1. Mastering the discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity is aimed at forming competencies in students. The discipline ensures the formation of competencies in students, depending on the types of professional tasks.

Name of the Category (Group) of Competencies	Code and Name of Competency	Indicators of Competency Achievement
General Professional Competencies		
Basic principles of fundamental and natural sciences	GPC-8. Able to use basic physical, chemical, mathematical and natural science concepts and methods dealing with professional problems	AI.GPC-8 ₁ - uses basic physical, chemical, mathematical and natural science concepts AI.GPC-8 ₂ - knows basic physical, chemical, mathematical, and natural science methods and applies them to deal with professional problems AI.GPC-8 ₃ - evaluates the effectiveness of basic physical, chemical, mathematical, and natural science methods dealing with professional problems

3.2. Types of professional activities based on the competencies formed during the implementation of B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity:

Type of Professional Tasks

1. *Medical*

Types of Professional Tasks

1. *Diagnostic Activity*

2. *Therapeutic Activity*

3.3. The planned learning outcomes of the discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity are expressed in knowledge, skills, abilities, and (or) experience, characterize the stages of competency formation, and ensure the achievement of the planned results of mastering the main educational program. The learning outcomes of the discipline are correlated with the indicators of competency achievement.

4. SCOPE AND CONTENT OF THE DISCIPLINE (MODULE)

4.1. Scope of the discipline B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity and types of academic work

Type of Academic Work		Всего часов	Semester	
			2 Semester	3 Semester
			hours	hours
1		2	3	4
Classroom Work (total), including:		122	98	24
Lectures (L)		34	18	18
Practical Classes (PC)		88	52	32
Independent Work of students (IW), including:		67	38	31
<i>Preparation for classes (PC)</i>		60	32	18
<i>Preparation for Current Control (PCC)</i>		9	6	13
<i>Preparation for Intermediate Assessment (PIA)</i>				
Intermediate Assessment		27		27
Type of Intermediate Assessment	Credit (C)			
	Exam (E)	Э		Э
TOTAL: Total Labor Intensity	час.	216	108	108
	units of labor intensity	6	3	3

4.2. Content of the Discipline

4.2.1. Lecture Topics and Number of Hours by Semesters of Studying the Discipline (Module) B1.O.07 Biological Chemistry – Biochemistry of the Oral Cavity

№	Lecture Topics	Hours
1	2	3
Semester 2		
1.	Introduction. Structural organization of proteins. Features of oligomeric protein	2

	functioning. The role of proteomics in medicine.	
2.	Enzymes. Enzyme structure, cofactors, and coenzymes. Isoenzymes. Types and significance of enzyme activity regulation. Enzyme inhibition. The use of enzymes in medicine.	2
3.	Biological oxidation and energy metabolism. General catabolism pathway. Tricarboxylic acid cycle. Organization of the mitochondrial respiratory chain, ATP synthesis. Action of inhibitors and uncouplers. Energy-deficient states.	2
4.	Extramitochondrial oxidation. Microsomal oxidation. Free radical oxidation, reactive oxygen species. Antioxidant protection.	2
5.	Carbohydrate metabolism. Glycolysis, dependence of the process on oxygen supply. Gluconeogenesis. Pentose phosphate pathway of glucose conversion. Regulation of blood glucose levels.	2
6.	Lipids of biological membranes, connection with cell function and adaptation. Synthesis and breakdown of lipids. Fatty acid metabolism. Synthesis of ketone bodies.	2
7.	Synthesis of TAG and phospholipids. Lipotropic factors. Synthesis and excretion of cholesterol. Transport lipoproteins in blood, structure, functions. Biochemistry of atherosclerosis.	2
8.	Nitrogen balance. Transamination and deamination of amino acids. Formation and detoxification of ammonia. Urea synthesis. Metabolism of individual amino acids. Formation of biogenic amines. Hereditary disorders of amino acid metabolism.	2
9.	Metabolism of nucleic acids and nucleotides, metabolic disorders. Mechanisms of matrix biosynthesis: DNA replication and repair, RNA transcription. Protein biosynthesis.	2
	Total hours per semester	18 hours
Semester 3		
1.	Biochemistry of mineralized tooth tissues (enamel, dentin, pulp, cementum).	4
2.	Formation of mixed saliva. Inorganic components of saliva and oral fluid.	4
3.	Proteins and enzymes of mixed saliva. Organic substances of saliva that are not proteins. Protective systems of the oral cavity.	4
4.	Biochemistry of gingival fluid and supragingival formations (dental plaque, tartar). Dental plaque and caries development. Tartar and inflammation of periodontal tissues.	6
	Total hours per semester	18 hours

4.2.2. Topics of practical classes and number of hours per semester for the discipline B1.O.07 Biological Chemistry - Oral Biochemistry

№	Practical class topics	Hours
1	2	3
Semester 2		
1	Structure and functions of proteins. Physical and chemical properties of proteins, protein precipitation reactions. Practical training - purification of protein solutions (dialysis), reversible protein precipitation reactions, irreversible protein precipitation reactions.	4

2	Structure of enzymes, features of enzymatic catalysis. Activators and inhibitors of enzymes. Enzyme diagnostics, enzyme pathology. Practical training - influence of pH, temperature, inhibitors, and activators on the catalytic activity of enzymes.	4
3	Structure and functions of vitamins. Practical training - determination of vitamin C in plant products. Knowledge assessment Module 1 "Structure, properties, and functions of proteins. Enzymes. Coenzyme functions of vitamins."	4
4	General catabolism pathways. Oxidative decarboxylation of pyruvate. Krebs cycle. Mitochondrial oxidation (CPE), ATP synthesis. Practical training - qualitative reactions to vitamins B1 and B2.	4
5	Extramitochondrial oxidation in the body. Knowledge assessment Module 2. "Biological oxidation."	4
6	Carbohydrate digestion. Main pathways of glucose metabolism. Anaerobic glycolysis. Differences between the final proton acceptors in aerobic oxidation and anaerobic glycolysis. Glucose biosynthesis (gluconeogenesis).	4
7	Pentose phosphate cycle of glucose oxidation. Synthesis and breakdown of glycogen. Regulation of carbohydrate metabolism. Biochemical methods for diagnosing carbohydrate metabolism disorders. Practical training - determining serum/urine glucose levels, assessing glucose tolerance Knowledge assessment Module 3. "Carbohydrate metabolism."	4
8	Lipid composition of membranes. Mechanisms of substance transport across membranes. Main stages of transmembrane signal transmission. Fat digestion. β -oxidation of fatty acids. Ketogenesis. Synthesis of TAG, phospholipids.	4
9	Cholesterol, functions, synthesis. Transport lipoproteins in blood. Atherosclerosis as a consequence of cholesterol and lipoprotein metabolism disorders. Practical training - determining the amount of cholesterol in blood. Knowledge assessment Module 4. "Lipid metabolism."	4
10	Protein digestion. Practical training - determination of gastric acidity. Amino acid metabolism: deamination, transamination. Ammonia formation, urea biosynthesis. Practical training - determination of urea levels in blood and urine.	4
11	Decarboxylation of amino acids, formation of biogenic amines. Transmethylation reactions, role of vitamins B9 and B12. Metabolism of individual amino acids. Knowledge assessment Module 5. "Amino acid metabolism."	4
12	Structure and functions of DNA and RNA. Biosynthesis and catabolism of nucleotides. Practical training: quantitative determination of uric acid in blood/urine.	4
13	Mechanisms of matrix biosynthesis. Gene mutations. Knowledge assessment Module 6 "Biosynthesis of nucleic acids and proteins."	4
14	The role of hormones in regulating metabolism. Regulation of the metabolism of major energy carriers. Practical training - qualitative reactions to hormones.	4
	Total hours per semester	52 hours
Semester 3		
1	Features of the metabolism of mineralized tissues of the oral cavity (enamel, dentin, pulp). GAP, possible variants of changes in their structure.	8
2	Formation of mixed saliva (oral fluid). Inorganic components, physical and chemical properties of saliva. Proteins, enzymes, organic substances of saliva that are not of a protein nature. Gingival fluid.	8
3	Biochemistry of supragingival formations (dental plaque, tartar). Mechanisms of caries development.	8
4	Knowledge assessment Module 9 "Biochemistry of oral tissues and fluids." Assessment of competency development	8

	Total hours per semester	32 hours
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4.2.3. Independent work by students

№ p/p	Name of the section of the academic discipline (module)	Types of IW	Total hours
1	3	4	5
Semester 2			
1	Structure, properties, and functions of proteins. Enzymes – protein catalysts. Coenzyme functions of vitamins.	- Preparation for class - Answers to test questions - Filling out tables: “Methods of protein research.” “Classification of proteins” “Individual vitamins: A, D, E, K, B1, B2, B5, PP, B6, C, B9, B12, C. Sources, manifestations of hypovitaminosis” - Compiling a glossary on the topic - Preparing for ongoing assessment	5
2	Biological oxidation. Energy metabolism.	- preparation for class - answers to test questions - independent study of the topic “Antioxidants” - compiling a glossary on the topic - compiling (filling in) tables - preparation for ongoing assessment - writing a report, presentation	5
3	Carbohydrate metabolism.	- preparation for class - answers to test questions - compiling a glossary on the topic - preparation for ongoing assessment - writing an essay or presentation	5
4	Lipid metabolism. Biological membranes.	- Preparation for class - Answers to test questions - Independent study of the topic “Cell membranes and their functions” - Compiling a glossary on the topic - Sketching the structure of the membrane - Compiling a table “Lipotropic factors” - Preparation for current assessment - Writing an essay, presentation	5
5	Amino acid metabolism.	- Preparation for class - Answers to test questions - Filling out the table “Biogenic amines” - Compiling a glossary on the topic - Preparation for ongoing assessment	5
6	Biosynthesis of nucleic acids and proteins. Fundamentals of molecular genetics.	- preparation for class - answers to test questions - compiling a glossary on the topic	5

		- filling out the “Types of Mutations” table - preparation for ongoing assessment - writing a report, presentation	
7	Hormonal regulation of metabolism and bodily functions.	- preparation for class - answers to test questions - compiling a glossary on the topic - filling out the table “Hormones” - preparation for current assessment - writing an essay, presentation	5
8	Blood biochemistry.	- Preparation for class - Answers to test questions - Compiling a glossary on the topic - Compiling (filling in) tables “Blood plasma proteins,” “Jaundice” - Preparation for current assessment - Writing a report, presentation	5
9	Biochemistry of non-mineralized tissues of the oral cavity. Processes of osteogenesis, resorption, and mineralization of bone tissue.	- preparation for classes - answers to test questions - compiling a glossary on the topic - writing an essay, presentation - preparation for module assessment	6
Total hours per semester			38 hours
Semester 3			
9	Module 9. Biochemistry of mineralized oral tissues (enamel, dentin, pulp).	- preparation for classes - answers to test questions - compiling a glossary on the topic - writing an essay, presentation - preparation for module assessment	7
10	Module 9. Biochemistry of oral fluids (oral and gingival fluids).	- preparation for classes - answers to test questions - compiling a glossary on the topic - writing an essay, presentation - preparation for module assessment	7
11	Module 9. Biochemistry of supragingival formations (dental plaque, dental calculus). Mechanisms of caries development	- preparation for classes - answers to test questions - compiling a glossary on the topic - writing an essay, presentation - preparation for module assessment	7
Total hours per semester			27 hours

5. CONDITIONS FOR IMPLEMENTATION OF THE DISCIPLINE (MODULE)

5.1. Teaching and methodological support and information resources for the academic discipline

B1.O.07 Biological Chemistry – Oral Biochemistry

Main literature

n/ №	Name, type of resource	Author(s) / Editor	Publication details, email address	Number of copies (accesses) Publication
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				details, email address in library and information center
1	2	3	4	5
1	Biological chemistry and biochemistry of the oral cavity. Situational problems and tasks: textbook	S. E. Severin, V. A. Golenchenko, T. A. Titova, et al.; edited by S. E. Severin	M.: GEOTAR-Media, 2017. – 239 p.	20
2	Biological chemistry. Biochemistry of the oral cavity: textbook for medical universities	T. P. Vavilova, A. E. Medvedev	M.: GEOTAR-Media, 2016. - 560 p. URL: http://www.studentlibrary.ru	Unlimited access
3	Biochemistry of tissues and fluids of the oral cavity: textbook. 3rd ed., revised and supplemented [Electronic resource]	Vavilova, T. P.	M.: GEOTAR-Media, 2023. - 208 p. URL: http://www.studentlibrary.ru/	Unlimited access

Additional literature

n/ №	Name, type of resource	Author(s) / Editor	Publication details, email address	Number of copies (accesses) Publication details, email address in library and information center
1	2	3	4	5
1	Oral Biochemistry: Textbook [Electronic resource]	L.A. Danilova, N.A. Chaika.	St. Petersburg: SpetsLit, 2012. - 62 p. URL: http://books-up.ru	Unlimited access
2	Biological Chemistry and Oral Biochemistry. Case Studies and Assignments: Textbook [Electronic resource]	edited by A. I. Glukhov.	M.: GEOTAR-Media, 2023. - 240 p. URL: http://studentlibrary.ru	Unlimited access
3	Vitamins and Vitamin-Like Substances in Dental Practice [Electronic resource]	O.A. Artyukova; A.K. Yatsenko.	Vladivostok: Medicine DV, 2020. — 101 p. URL: https://lib.rucont.ru/	Unlimited access

Internet resources

1. ELS “Student Advisor” <http://studmedlib.ru/>
2. ELS “University Library Online” <http://www.biblioclub.ru/>
3. ELS “Yurait” <https://urait.ru/>
4. ELS «BookUp» <https://www.books-up.ru/>

5. Own resources of the Information and Computing Center of the Federal State Budgetary Educational Institution of Higher Education PSMU of the Ministry of Health of Russia PSMU <https://tgmu.ru/university/bibliotechno-informacionnyj-centr/resursy-bic/sobstvennye/>

Internet resources and instructions for their use are available on the Library and Information Center page. [Библиотечно-информационный центр — ТГМУ \(tgmu.ru\)](#)



5.2. Material and technical support for the academic discipline

Information about the material and technical support for the discipline is available on the university's official website.

[Материально-техническое обеспечение и оснащённость образовательного процесса. Тихоокеанский государственный медицинский университет Министерства здравоохранения Российской Федерации \(tgmu.ru\)](#)



5.3. List of information technologies used to implement the educational process in the discipline, information and reference systems, licensed and freely distributed software, including domestically produced software:

1. PolycomTelepresence M100 Desktop Conferencing Application (BKC)
2. SunRav Software tTester
3. 7-PDF Split & Merge
4. ABBYYFineReader
5. Kaspersky Endpoint Security
6. Online testing system INDIGO
7. Microsoft Windows 7
8. Microsoft Office Pro Plus 2013
9. 1С:Университет
10. Гарант
11. MOODLE(modular object-oriented dynamic learning environment)

6. Features of implementing the discipline for students with disabilities and limited health capabilities

6.1. Availability of appropriate conditions for the implementation of the discipline

For students with disabilities and students with limited health capabilities (LHC), based on a written application, the discipline is implemented taking into account the peculiarities of psychophysical development, individual capabilities, and health status (hereinafter referred to as individual characteristics). The following general requirements shall be met: the use of special

technical means of collective and individual learning, the provision of an assistant (aide) to provide such students with the necessary technical assistance, ensuring access to buildings and premises where classes are held, and other conditions without which it is impossible or difficult to study the discipline.

6.2. Ensuring compliance with general requirements

When implementing the discipline on the basis of a written statement from the student, the following general requirements shall be ensured: conducting classes for students with disabilities and persons with special educational needs in the same classroom together with students who do not have limited health capabilities, if this does not create difficulties for the students; the presence in the classroom of an assistant (assistants) who provides (them) with the necessary technical assistance, taking into account their individual characteristics; the use of technical means necessary for students, taking into account their individual characteristics.

6.3. Informing students with disabilities in a form accessible to them of all local regulations of the Federal State Budgetary Educational Institution of Higher Education PSMU of the Ministry of Health of Russia.

All local regulations of the Federal State Budgetary Educational Institution of Higher Education PSMU of the Ministry of Health of Russia on the implementation of the discipline are communicated to students with disabilities in a form accessible to them.

6.4. Implementation of an increase in the duration of interim assessment in relation to the established duration for students with disabilities

The form of current and interim assessment in a subject for students with disabilities and persons with limited health capabilities is established taking into account individual psychophysical characteristics (orally, in writing on paper, in writing on a computer, in the form of testing, etc.). The duration of interim assessment in relation to the established duration is increased upon written request of the student with disabilities. The duration of the student's preparation for the test is increased by at least 0.5 hours.

7. STAFFING FOR THE DISCIPLINE

The composition of scientific and teaching staff ensuring the implementation of the educational process for the discipline complies with the requirements of the Federal State Educational Standard of Higher Education for specialty 31.05.03 Dentistry and is posted on the website of the educational organization.



8. EDUCATIONAL WORK IN THE IMPLEMENTATION OF THE DISCIPLINE

B1.O.07 Biological Chemistry - Oral Biochemistry

Type of educational work	Forms and directions of educational work	Evaluation criteria
Assistance in personal development	Open – debates, master classes, competitions, professional events (volunteers, organizers, administrators) Participation in subject-specific and interdisciplinary competitions, practical contests, scientific and practical conferences, and symposiums	Portfolio
	Hidden – creating an atmosphere, infrastructure Forming motivation for professional, scientific	

	research, organizational management, and other types of professional activities	
Civic values	Open Current short debates in the event of special events	Portfolio
	Hidden Development of socially significant personal qualities and independent experience in social activities	
Social values	Open Coverage of environmental issues, environmental problems as a factor affecting public health and specific population risks	Portfolio
	Hidden Identification in the social structure when receiving education and pursuing professional activities	