Federal State Autonomous Educational Institution of Higher Education
PEOPLES' FRIENDSHIP UNIVERSITY OF RUSSIA
named after Patrice Lumumba
RUDN University

Institute of Medicine

educational division (faculty/institute/academy) as higher education programme developer

COURSE SYLLABUS

Microbiology, Virology - Oral Microbiology

course title

Recommended by the Didactic Council for the Education Field of:

31.05.03 Dentistry

field of studies / speciality code and title

The course instruction is implemented within the professional education programme ofhigher education:

Dentistry

higher education programme profile/specialisation title

2026

1. COURSE GOAL(s)

The discipline "Microbiology, Virology - Oral Microbiology" is included in the program of the specialist program "Dentistry" in the direction of 31.05.03 "Dentistry" and is studied in the 3rd and 4th semesters of the 2nd year. The discipline is implemented by the Department of Microbiology named after V.S. Kiktenko. The discipline consists of 9 sections and 29 topics and is aimed at studying general and specific microbiology and virology, as well as pathogens of the main human infectious diseases that cause pathological manifestations in the oral cavity.

The goal of the course is to acquire knowledge about the diversity of the world of microorganisms, about their role in human pathology, the theoretical foundations for diagnosing infectious diseases, the principles of microbiological research, about opportunistic infections of the oral cavity.

2. REQUIREMENTS FOR LEARNING OUTCOMES

Mastering the course "Microbiology, Virology - Oral Microbiology" is aimed at the development of the following competences /competences in part: GPC-9

Table 2.1. List of competences that students acquire through the course study

Competence code	**Competence**	**Indicators of Competence Formation** (within the framework of this discipline)
GPC-9	Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems	GPC-9.1. Owns the algorithm of clinical, laboratory and functional diagnostics in solving professional tasks.
		GPC-9.2. Evaluates the results of clinical, laboratory and functional diagnostics in solving professional tasks.
		GPC-9.3. Determines morphofunctional physiological states and pathological processes of the human body.

3. COURSE IN HIGHER EDUCATION PROGRAMME STRUCTURE

The course refers to the core/variable/elective* component of (B1) block of the higher educational programme curriculum.

* - Underline whatever applicable.

Within the higher education programme students also master other (modules) and / or internships that contribute to the achievement of the expected learning outcomes as results of the course study.

Table 3.1. The list of the higher education programme components/disciplines that contribute to the achievement of the expected learning outcomes as the course study results

Competence code	Competence descriptor	Previous courses/modules*	Subsequent courses/modules*
GPC-9	Able to assess morphofunctional, physiological conditions and pathological processes in the human body to solve professional problems	Human Anatomy - Head and Neck Anatomy Histology, Embryology, Cytology - Oral Histology Normal physiology, physiology of the maxillofacial region	Pathological anatomy - Pathanatomy of the head and neck Pathophysiology - Pathophysiology of the head and neck Ophthalmology Forensic medicine Obstetrics Oral surgery Maxillofacial and gnatic surgery Diseases of the head and neck Pediatric dentistry Orthodontics and children's prosthetics Medical rehabilitation Implantology and reconstructive surgery of the oral cavity

* To be filled in according to the competence matrix of the higher education programme.

4. COURSE WORKLOAD AND ACADEMIC ACTIVITIES

The total workload of the course is «**Microbiology, Virology - Oral Microbiology**» 6 credits (216 academic hours).

*Table 4.1. Types of academic activities during the periods of higher education programme mastering (**full-time training**)**

Type of academic activities	Total academic hours	Semesters/training modules

			3	**4**
Contact academic hours		**123**	**51**	**72**
including:				
Lectures (LC)		**35**	**17**	**18**
Lab work (LW)				
Seminars (workshops/tutorials) (S)		**88**	**34**	**54**
Self-studies		*48*	*30*	*18*
Evaluation and assessment (exam/passing/failing grade)		*45*	*27*	*18*
Course workload	academic hours	**216**	**108**	**108**
	credits	**6**	**3**	**3**

* To be filled in regarding the higher education programme correspondence training mode.

5. COURSE CONTENTS

Table 5.1. Course contents and academic activities types

Course module title	**Course module contents (topics)**	**Academic activities types**
Section 1 General microbiology	1.1 Morphology of microorganisms The concept of systematics and classification of microorganisms. Taxonomic categories. Principles of the modern Bergey's classification of bacteria. Prokaryotes and eukaryotes. Main forms and polymorphism of bacteria. Structure of the bacterial cell. Morphological and structural features of spirochetes, actinomycetes, mycoplasmas, rickettsiae, and chlamydiae. Simple and complex methods of microbial staining. Microscopy methods.	LC, S

	1.2 Physiology of microorganisms Chemical composition of the bacterial cell. Microbial enzymes, their classification. Nutrition of microorganisms. The essence and types of biological oxidation of substrates by microorganisms. Classification of microbes by respiration type. Growth and reproduction of microorganisms. Culture media for cultivating microorganisms and requirements for them, classification of culture media. Peculiarities of cultivating strict anaerobes. The concept of cultural, enzymatic, and other properties of microbes.	LC, S
	1.3 Genetics of microorganisms Organization of genetic material in bacteria: chromosome, mobile genetic elements (IS-elements, transposons, integrons). Their structure, mechanisms of movement, and role in the formation of antibiotic resistance. Bacterial plasmids: structure, replication, classification (by function). R-plasmids as a key factor in antibiotic resistance. Mechanism of conjugation. Horizontal gene transfer: transformation, transduction, conjugation. Bacterial variability: phenotypic (modificational) and genotypic (mutations, horizontal transfer).	LC, S
	1.4 The influence of environmental factors on microorganisms Influence of physical factors. Concept of sterilization and asepsis. Action of chemical substances. Concept of disinfection and antisepsis. Influence of biological factors on microorganisms. Colicins. Antibiotics. Producers of antibiotics, principles of their production. Mechanism and spectrum of antibiotic action. Antibiotic resistance of microbes.	LC, S

Course module title	Course module contents (topi
	1.5 Relationships of microbial populations in the body Normal human microbiota and its functions. The gut microbiota-brain axis (micro microbiota-immune system axis (microorganisms and their functions). Dysbiosis, Probiotics and prebiotics.
Section 2 General virology	2.1 Structure and chemical composition of viruses Nature and origin of viruses. Forms of virus existence in nature. Principles of virio Types of symmetry and their determinants. Types of viral genomes. Structural proteins. Ability of virions to self- assemble. L and significance.
	2.2 Reproduction of viruses Forms of virus-cell interaction: productive, integrative, and latent infection. Virus processes ensuring the realization of genetic information.
	2.3 Cultivation of viruses Cultivation of viruses in naturally susceptible and laboratory animals, in chicken biological systems in the laboratory diagnosis of viral diseases.
	2.4 Bacteriophages Phage interaction with the bacterial cell. Temperate and virulent bacteriophages. application of bacteriophages for prevention, treatment, and phage typing.
Section 3 Fundamentals of the theory of infection and immunity	3.1 Theory of infection Definition of infection, infectious process, and infectious disease. Conditions for Pathogenicity and virulence of microbes. Quantitative determination of virulence Pathogenic and opportunistic microorganisms. Factors of pathogenicity. Characte specificity, virulence, toxicity, etc.). Microbial toxins (exotoxins and endotoxins). Properties and chemical compositio process (susceptibility, infectious dose, portal of entry, organotropism). Dynamics pathogenic microorganisms. Forms of infection manifestation. Concept of relapse superinfection.
	3.2 Fundamentals of immunity. Serological method for diagnosing infectious diseases Definition of immunity. Forms and types of immunity. Species- specific and indiv Functions and activation pathways of complement components. Immunoglobulins. Structure. Classes and types of immunoglobulins. Role in the f nonspecific resistance of the organism. Phagocytic theory of immunity. Antigens: definition, main properties. Antigens o Antibody formation: primary and secondary immune response. Affinity and avidit Hypersensitivity, types. Mechanisms of occurrence, clinical significance. Serologi Bacterial preparations
Section 4 Medical microbiology	4.1 Pathogenic and resident cocci Staphylococci, streptococci, neisseriae. Taxonomy, morphology, tinctorial and cu pathogenicity factors, pathogenesis, epidemiology, immunity, prevention, treatme
	4.2 Causative agents of airborne infections Causative agent of diphtheria. Pathogenic mycobacteria. Causative agents of tube tinctorial and cultural properties, antigenic structure, pathogenicity factors, pathog treatment. Laboratory diagnosis of airborne infections.
	4.3 Pathogenic and resident anaerobic bacteria

	Causative agents of gas gangrene and tetanus. Taxonomy, morphology, tinctorial pathogenicity factors, pathogenesis, epidemiology, immunity, prevention, treatme infections.
	4.4 Pathogenic spirochetes Causative agent of syphilis. Borrelia and borrelioses. Causative agents of leptospi cultural properties, antigenic structure, pathogenicity factors, pathogenesis, epide laboratory diagnosis.
	4.5 Pathogenic rickettsiae and chlamydiae Causative agents of epidemic typhus, Q fever, and other rickettsioses. Causative a morphology, tinctorial and cultural properties, antigenic structure, pathogenicity f prevention, treatment, laboratory diagnosis.
Section 5 Medical virology	5.1 Herpesvirus infection Herpes simplex virus and varicella-zoster virus. Taxonomy and characteristics of of prevention.
	5.2 Viral hepatitis Causative agents of enteric and parenteral hepatitis. Taxonomy. Characteristics o Prevention.
	5.3 Retroviruses Human immunodeficiency viruses. Taxonomy. Characteristics of the pathogens. M Epidemiology. Features of pathogenesis and clinical presentation. Oral manifestat
	5.4 Enterovirus infections Coxsackie virus. Rhabdoviruses. Vesiculovirus. Taxonomy. Characteristics of the
	5.5 Diseases of viral etiology with oral mucosal involvement Causative agents of measles, papillomavirus infection, and foot-and-mouth disease. Taxonomy. Characteristics of the pathogens. Laboratory
Section 6 Oral microbiology	6.1 Characteristics of the human oral microbiota Factors that promote and inhibit microbial colonization of the oral cavity. Format Obligate anaerobic, facultative anaerobic, and aerobic oral microbiota: taxonomy maxillofacial region.
	6.2 Opportunistic processes in the oral cavity Fusospirochetosis. Candidiasis, recurrent aphthous stomatitis, glossitis, gingivitis
	6.3 Microbiota in odontogenic infection Microbiota in pulpitis, periodontitis, abscess, phlegmon, osteomyelitis, sepsis.
	6.4 Role of the oral microbiota in the pathogenesis of caries and inflammatory proces Dental surface biofilm and the pathogenesis of dental caries. Experimental model a vaccine against caries. Periodontal diseases.
	6.5 Methods of microbiological research used in dentistry General rules and standards for microbiological examination of various oral biotop Bacteriological (cultural) examination method using anaerobic cultivation techniq

* - to be filled in only for **full** -time training: *LC - lectures; LW - lab work; S - seminars.*

6. CLASSROOM EQUIPMENT AND TECHNOLOGY SUPPORT

REQUIREMENTS

Table 6.1. Classroom equipment and technology support requirements

Type of academic activities	**Classroom equipment**	**Specialised educational / laboratory equipment, software, and materials for course study** (if necessary)
Lecture	A classroom equipped with a set of specialized furniture; whiteboard (screen) and technical means of multimedia presentations.	Classroom for lectures and seminars, group and individual consultations, current control and intermediate certification. A set of specialized furniture; Technical facilities: multimedia projector TOSHIBA X200, laptop ASUS F9E Core 2 DUO T5750, Internet access. Software: Microsoft products (OS, suite of office applications, incl. MS Office/ Office 365, Teams, Skype)
Seminar	A classroom for laboratory work, individual consultations, seminars, routine control and intermediate certification, equipped with a set of specialized furniture and equipment.	The laboratory is equipped with specialized laboratory furniture; gas burners, chalk boards; Technical means: Baronet 3.4 244/96 8 152*203MW electric screen, Epson EB-X 05 multimedia projector, HP 6715s TL60 laptop, Biomed-5 and BiOptic microscopes, TSvL-160 dry-air laboratory thermostat, Indesit SD refrigerator 167. Items necessary for microbiological research: instruments (bacteriological loops and tweezers), laboratory glassware, a set of dyes, nutrient media, cultures of microorganisms.
Self-studies	A room for independent work of students (may also be used for seminars and consultations), equipped with a set of specialized furniture and computers with access to the Electronic Information and Educational Environment (EIEE)	The laboratory is equipped with specialized laboratory furniture; chalk board; microscopes "Biomed-5" and "BiOptic".

* - the auditorium for independent work of students is **MANDATORY!**

7. RESOURCES RECOMMENDED FOR COURSE STUDY

Basic readings:

1. Microbes: The Life-Changing Story of Germs / P. K. Peterson. - Электронные текстовые данные. - Prometheus, 2020. - 294 c. - ISBN 9781633886346. https://mega.rudn.ru:443/MegaPro/UserEntry?Action=Rudn_FindDoc&id=514822&idb=0

2. Medical Microbiology, Virology, Immunology: textbook. Vol. 1 : учебник / V.V. Zverev, M.N. Boichenko ; Zverev V.V., Boichenko M.N. - Москва : ГЭОТАР-Медиа, 2022. - 384 с. - ISBN 978-5-9704-7072-5. https://mega.rudn.ru:443/MegaPro/UserEntry?Action=Rudn_FindDoc&id=519312&idb=0

3. Medical Microbiology / Edited by Anil K. Sharma, Girish Kumar Gupta, Mukesh Yadav. - Электронные текстовые данные. - De Gruyter, 2022. - 273 c. - ISBN 9783110517644. https://mega.rudn.ru:443/MegaPro/UserEntry?Action=Rudn_FindDoc&id=514447&idb=0

4. Laboratory Techniques of Medical Microbiology = Лабораторные методы медицинской микробиологии : tutorial / A.V. Ermolaev. - Электронные текстовые данные. - М. : РУДН, 2018. - 63 с. : ил. - ISBN 978-5-209-08556-0. https://mega.rudn.ru:443/MegaPro/UserEntry?Action=Rudn_FindDoc&id=470410&idb=0

Additional readings :

1. Abbas AK, Lichtman AH, Pillai S. *Basic Immunology: Functions and Disorders of the Immune System*. 5th ed. Elsevier; 2016.

2. Bauman RW. *Microbiology with Diseases by Body System*. Benjamin-Cummings; 2014.

3. Hupp JR, Ferneini EM. *Head, Neck, and Orofacial Infections: An Interdisiplanary Approach*. Elsevier; 2016.

4. Lamont RJ, Hajishengallis G, Koo H, Jenkinson HF. *Oral Microbiology and Immunology*. Asm Press; 2019.

5. Levinson W. *Review of Medical Microbiology and Immunology*. 17th ed. Mcgraw-Hill; 2022.

6. lsevier Ltd. *MCQs for Oral Microbiology E-Book*. Elsevier; 2015.

7. Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA. *Brock Biology of Microorganisms*. 14th ed. Pearson; 2015.

8. Murray PR, Rosenthal KS, Pfaller MA. *Medical Microbiology*. 8th ed. Elsevier; 2016.

9. Murray PR. *Murray's Basic Medical Microbiology E-Book*. Elsevier Health Sciences; 2023.

10. Subhash Chandra Parija. *Textbook of Microbiology & Immunology*. ELSEVIER; 2012.

11. Török ME, Cooke FJ, Moran E. *Oxford Handbook of Infectious Diseases and Microbiology*. Oxford University Press; 2017.

12. Walsh CT, Wencewicz T. *Antibiotics: Challenges, Mechanisms, Opportunities*. Washington, Dc Asm Press; 2016.

13. Willey JM, Sandman K, Wood D. *Prescott's Microbiology*. 11th ed. Mcgraw-Hill Education; 2020.

14. Wilson ME. *Antibiotics: What Everyone Needs to Know*. Oxford University Press; 2019.

15. Zhou X, Li Y. *Atlas of Oral Microbiology: From Healthy Microflora to Disease*. Springer; 2022.

Resources of the information and telecommunication network "Internet":

1. RUDN University Electronic Library System (ELS) and third-party ELS, to which university students have access on the basis of concluded contracts:

- RUDN University Electronic Library System – ELS RUDN http://lib.rudn.ru/MegaPro/Web
- ELS "University Library Online" http://www.biblioclub.ru
- ELS Urait http://www.biblio-online.ru
- ELS "Student Consultant" www.studentlibrary.ru
- ELS "Troitsky Most"

2. Databases and Search Engines:
- Electronic collection of legal, regulatory and technical documentation http://docs.cntd.ru/
- Yandex search engine https://www.yandex.ru/
- Google search engine https://www.google.ru/
- SCOPUS abstract database http://www.elsevierscience.ru/products/scopus/

Educational and methodological materials for independent work of students when mastering a discipline/module:*

1. Course of lectures on the discipline "**Microbiology, Virology – Oral Microbiology**".

* - all educational and methodological materials for independent work of students are placed in accordance with the current procedure on the page of the discipline **in TUIS!**

8. ASSESSMENT TOOLKIT AND GRADING SYSTEM* FOR EVALUATION OF STUDENTS' COMPETENCES LEVEL UPON COURSE COMPLETION

The assessment toolkit and the grading system* to evaluate the competences formation level (GPC-9) upon the course study completion are specified in the Appendix to the course syllabus.

* The assessment toolkit and the grading system are formed on the basis of the requirements of the relevant local normative act of RUDN University (regulations / order).

DEVELOPER:

N.V. Yashina

Associate Professor of the Department of Microbiology named after V.S. Kiktenko

Position, BEU	*Signature*	*Surname N.P.*

HEAD OF EDUCATIONAL DEPARTMNET:

I.V. Podoprigora

Head of the Department of Microbiology named after V.S. Kiktenko

Position, BEU	*Signature*	*Surname N.P.*

HEAD OF THE EDUCATIONAL PROGRAMME OF HIGHER EDUCATION:

S.N. Razumova

Deputy Director of Institute of Medicine		
Position, BEU	*Signature*	*Surname N.P.*