

Federal State Autonomic Educational Institution of Higher Education  
«Peoples' Friendship University of Russia»

*Medical Institute*

Recommended MCSD

**SYLLABUS**  
(STUDY GUIDE)

**Subject**

**Microbiology, Virology**

**Recommended for the direction of training (specialty)**

**31.05.01 General Medicine**

**Program (profile, specialization)**

**General Medicine**

**1. Aims and objectives of discipline:** The main aims and objectives of the discipline is an investigation of the pathogenic and opportunistic microorganisms, their systematics, biological properties, role in human pathology, theoretical bases of diagnostics of infectious diseases, principles of the prophylaxis and etiologic treatment of the human infectious diseases.

**2. Place of discipline in the structure of OP HE:**

Discipline Microbiology, virology refers to the basic part of Block 1 of the curriculum.

Table №1 given preceding and following discipline aimed at forming competence discipline in accordance with the matrix competences OP HE.

Table 1.

Preceding and following the discipline aimed at creating competencies

№ п/п	Code and title of competence	Preceding disciplines	Following disciplines
General Professional Competence			
1.	GPC-5. Being able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional tasks	Biology Histology, embryology, cytology Anatomy	Infectious diseases Phthisiatry Epidemiology Dermatovenereology

**3. Requirements to results of development of discipline:**

The process of studying the discipline is aimed at the formation of the following competencies:

Table 2.

**Forming competencies**

General Professional Competence Category	General Professional Competence Code and Name	General Professional Competence Achievement Indicator Code and Name
Etiology and pathogenesis	GPC-5. Being able to assess morpho-functional, physiological conditions and pathological processes in the human body to solve professional tasks	GPC-5.1. Mastering the algorithm of clinical, laboratory and functional diagnosis when dealing with professional tasks. GPC-5.2. Being able to evaluate the results of clinical, laboratory and functional diagnosis when dealing with professional tasks. GPC-5.3. Being able to determine morpho-functional, physiological states and pathological processes of the human body.

As a result of study of discipline a student must:

**Know:** rules of work and safety in microbiological laboratories with a live cultures of microorganisms, reagents, devices, animals; chemical and biological essence of the processes occurring in a living organism at the molecular and cellular levels; the laws of genetics its importance for medicine and dentistry including laws of heredity and variability in individual development as the basis for understanding the pathogenesis and etiology of hereditary and multifactorial diseases; classification, morphology and physiology of microorganisms and viruses, their impact on human health; Microbiology of the oral cavity, methods of microbiological diagnosis, the use of basic antibacterial, antiviral and biological drugs; scientific principles of sterilization, disinfection and antiseptic treatment to avoid infection when working in dental practice.

**Be handy at:** use educational, scientific, popular science literature, the Internet for professional activities; use laboratory equipment; work with magnifying equipment (microscopes; simple optical magnifiers) interpret the results of the most common methods of laboratory diagnosis.

**Manage:** the skills of microscopy, simple tools (spatula, bacteriological loop, forceps, dissecting needle), the technique of seeding of microorganisms in liquid and solid media skills and performances of serological reactions. information about the principles of sterilization, disinfection and antiseptic treatment of instruments and equipment in order to avoid infection of the doctor and the patient

#### 4. Volume of discipline and types of study

General credit value of the discipline is 8 credit units.

Type of study load	Total hours	Semesters	
		4	5
<b>Class hours (total)</b>	180	90	90
Include:	-	-	-
<i>Lectures</i>	36	18	18
<i>Practical training (PT)</i>			
<i>Seminars (S)</i>			
<i>Laboratory research (LR)</i>	144	72	72
<b>Independent work (total)</b>	108	54	54
Total labor input	hours 288	144	144
Credit Unit	8	4	4

#### 5. Content of the discipline

##### 5.1. The content of the discipline sections

№ п/п	Name of the section of discipline	Contents of the section
1.	The subject and objectives of Microbiology and	Microbe as a living system. Morphology and Structure of microorganisms. Principles of classification. Microscopic

	Virology, their importance in medical practice.	techniques.
2.	Physiology of microorganisms.	Growth and reproduction. Aerobic and anaerobic bacteria. An enzymatic activity of the microorganisms.
3.	Genetics of microorganisms	Types of variability, exchange of genetic information in microbes.
4.	General Virology.	The structure of viruses, the interaction of viruses with cells, the reproduction of viruses. Bacteriophages.
5.	The relationship of microbial populations in the body.	Synergy and antagonism. Antibiotics. The main groups of antibiotics, the mechanism of their action. Antibiotic resistance and ways to overcome it.
6.	The doctrine of infection.	Dynamics of the infectious process, types of infections.
7.	Pathogenic and resident cocci.	Staphylococci, streptococci. Causative agents of gonorrhoea and meningococcal infection.
8.	Causative agents of respiratory infections.	Causative agent of diphtheria. The causative agents of whooping cough and paraptussis.
9.	Pathogenic mycobacteria.	The causative agents of tuberculosis and leprosy.
10.	Pathogenic and resident anaerobic bacteria.	Causative agents of gas gangrene, tetanus and botulism. Do not spores forming anaerobes that are involved in the pathology of the oral cavity.
11.	The causative agents of zoonotic diseases	The causative agents of zoonotic diseases: plague, tularemia, anthrax and brucellosis.
12.	The causative agents of intestinal infections.	Typhoid fever, dysentery, salmonellosis, cholera, escherichiosis. Compylobacter and helicobacter.
13.	Agents of spirochetosis.	Syphilis. Borreliosis and Lyme diseases, Leptospirosis,
14.	Pathogenic Rickettsia and chlamydia.	Causative Agents of epidemic typhoid fever, Q- fever and other rickettsioses. Causative agents of chlamydia.
15.	Protozoal infection.	The causative agents of amoebiasis, balantidiasis, trypanosomiasis, leishmania and malaria
16.	Mycotic infection	Classification of mycoses. Dermatomycosis. Candidiasis, pneumocytosis
17.	Viral infections	Polio, influenza, herpes, HIV and AIDS. Hepatitis. Viruses of hemorrhagic fevers

## 5.2. Sections of disciplines and types of classes

№ п/п	Name of the section of discipline	L	PC	LR	S	Ssgw	Total hours
1.	Microbiology as the science.	2		8		6	16

	Subject and tasks of Microbiology. Stages of development, methods. Classification of the microorganisms. Morphology and structure. Microscopy techniques						
2.	Physiology of microorganisms.	2		16		12	30
3.	Genetic of microorganisms.	2		8		6	16
4.	General virology.	2		8		6	16
5.	The relationship of microbial populations in the body.	2		4		6	12
6.	The doctrine of infection.	2		4		6	12
7.	Pathogenic and resident cocci.	2		8		6	16
8.	Causative agents of respiratory infections.	2		8		4	14
9.	Pathogenic mycobacteria.	2		8		4	14
10.	Pathogenic and resident anaerobic bacteria.	2		8		4	14
11.	The causative agents of zoonotic diseases.	2		8		4	14
12.	The causative agents of intestinal infections.	2		8		6	16
13.	Agents of spirochetosis.	2		8		8	18
14.	Pathogenic Rickettsia and chlamydia.	2		8		8	18
15.	Protozoa infection.	2		8		8	18
16.	Mycoses.	2		8		6	16
17.	Viral infections.	4		16		8	28

## 6. Laboratory training

№ п/п	№ discipline section	Subject of a practical training (seminars)	Workload (hours)
1.	1	Organization, equipment and rules of work in bacteriological laboratory. Methods of studying microorganisms. Microscopes: brightfield, luminescent, phase-contrast, dark-field. Morphology of bacteria. Simple and complex methods of staining: Gram staining, staining of spores, capsules, flagella. The study of microbes in a living state.	8
2.	2	Nutrient mediums. Methods of sterilization and disinfection. Methods of aerobic cultivation. Isolation of	8

		pure aerobic cultures.	
3.	2	Methods of identification of pure cultures of microbes. Investigation of biochemical properties of microbes.	8
4.	2	Methods of cultivation of anaerobes. Isolation of pure the cultures of anaerobic bacteria and their identification.	4
5.	4,5	Antibiotics. Bacteriophages and their application.	8
6.	3,5	Normal microflora of the human body. Genetic of microorganisms.	8
7.	6	The doctrine of infection. Experimental infection and bacteriological examination of dead animals. Methods of laboratory diagnostics of infectious diseases.	4
8.	7	Staphylococci, Streptococci, Neisseria. Laboratory diagnosis of coccal infections.	8
9.	8	Differential diagnosis of pathogenic and resident Corynebacteria. Laboratory diagnosis of pertussis and parapertussis.	8
10.	9	Laboratory diagnosis of tuberculosis and leprosy.	8
12.	10	Laboratory diagnosis of anaerobic infections: tetanus, gas gangrene, botulism.	8
13.	11	Laboratory diagnosis of zoonotic diseases: plague, tularemia, anthrax and brucellosis.	8
14.	12	Laboratory diagnosis of typhoid fever, dysentery, salmonellosis, cholera, escherichiosis. Compylobacter and helicobacter.	8
16.	13	Laboratory diagnosis of syphilis, borreliosis and Lyme diseases and leptospirosis.	8
17.	14	Laboratory diagnosis of epidemic typhoid fever, Q- fever and other rickettsioses. Laboratory diagnosis of chlamydia.	8
18.	15	Laboratory diagnosis of protozoa infection.	8
19.	16	Laboratory diagnosis of mycoses.	8
20.	17	Laboratory diagnosis of viral infections.	16

### **7. Material and technical support of the discipline:**

For conducting classes, group and individual consultations, current control and intermediate certification, training laboratories 310 and 311 and the classroom 332 are used, located at the address: Moscow, Miklukho-Maklaya str., 8.

Laboratories are equipped with specialized laboratory furniture; gas burners, chalk board; technical means: electric screen Baronet 3.4 244/96 8 152\*203MW, Epson EB-X05 multimedia projector, HP 6715s TL-60 laptop, Biomed-5 microscopes, TSvL-160 dry-air laboratory thermostat, Indesit SD 167 refrigerator, AZ-01 anaerostat, PCYA-10 ovoscope, PVF-35/1NB vacuum filtration device. Items necessary for microbiological research: tools (bacteriological loops and tweezers), laboratory utensils, a set of dyes, nutrient media, cultures of microorganisms. When setting up experiments in laboratory classes, the scientific equipment of the educational and scientific bacteriological laboratory (centrifuges, autoclave, dry-burning cabinet) is used.

### **8. Information support of the discipline:**

a) Software:

The corporate licensing program (Microsoft Subscription) Enrollment for Education Solutions (EES) No. 56278518 dated 23.04.2019 (renewed annually, the program is assigned a new number).

б) Databases, reference and search systems:

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

- Electronic library system of RUDN – ELS of RUDN <http://lib.rudn.ru/MegaPro/Web>

- ELS «University library online» <http://www.biblioclub.ru>

- ELS Yurayt <http://www.biblio-online.ru>

- ELS «Student consultant» [www.studentlibrary.ru](http://www.studentlibrary.ru)

- ELS «Lane» <http://e.lanbook.com/>

- Student consultant [Electronic resource]: Database / Publishing group "GEOTAR-Media"; LLC "Institute of health management problems". - Moscow: GEOTAR-Media, 2013. - Access mode: <http://www.studmedlib.ru/> Access by login and password after registration from the territory of RUDN. The link to the resource: <http://lib.rudn.ru:8080/MegaPro/Web>

- Page of the Microbiology and Virology Department on the educational portal of the RUDN. The link to the resource: <http://web-local.rudn.ru/web-local/kaf/rj/index.php?id=65>

2. Databases and search engines:

- search system Yandex <https://www.yandex.ru/>

- search system Google <https://www.google.ru/>

- abstract database Scopus <http://www.elsevierscience.ru/products/scopus/>

-documentation center World health organisation <http://whodc.mednet.ru/>

- database elibrary.ru - scientific electronic library <http://elibrary.ru/defaultx.asp>

- U.S. National Library of Medicine National Institutes of Health:  
<http://www.ncbi.nlm.nih.gov/pubmed/>

## **9. Educational and methodical support of the discipline:**

a) Main literature

1. Medical microbiology. – Seventeenth Edition. London: Elsevier, 2007. – 738 p.

б) Additional literature

1. Levinson W. Review of Medical Microbiology and Immunology. 14th Edition. - McGraw-Hill Education, 2016. - 832 p.

2. Ermolaev A.V. Introduction into medical microbiology reff lecture. Tutorial 2013. -70 p.

3. Ermolaev A.V. Laboratory techniques of medial microbiology. Tutorial 2013. -70 p.

## **10. Guidelines for students on the development of the discipline (module)**

To carry out independent work in the classroom, the staff of the Department developed guidelines:

1. Ermolaev A.V. Introduction into medical microbiology reff lecture. Tutorial 2013. -70 p.

2. Ermolaev A.V. Laboratory techniques of medial microbiology. Tutorial 2013. -70 p.

## **11. Fund of evaluation tools for conducting intermediate certification of students in the discipline "Microbiology, virology"**

Materials for assessing the level of mastering the educational material of the discipline "Microbiology, virology" (evaluation materials), which include a list of competencies indicating the stages of their formation, a description of indicators and criteria for evaluating competencies at various stages of their formation, a description of evaluation scales, standard control tasks or other materials necessary for evaluating knowledge, skills, skills and (or) experience of activity that characterize the stages of competence formation in the process of mastering the educational program, methodological materials that define the procedures for evaluating knowledge, skills, skills and (or) experience of activity, describing the stages of competence formation, developed in full and available to students on the discipline page in the TUIS RUDN.

The program is compiled in accordance with the requirements of the FSES HE.

### **Developers:**

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