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

APPROVED by
Deputy Rector for Academic Affairs

_____ E.V. Konovalova

_13_ June 2024г., Record No 5

Microbiology, Virology

Syllabus

Department **МорфоLогии и физиоLогии**

Curriculum s310501-LечДеLоИн-24-1.plx
Specialty 31.05.01 General Medicine

Qualification **General Practitioner**

Form of education **Full-time**

Total (in credits) **6**

Total academic hours 216
including:
Classes 128
Self-study 52
Control 36

Control:
5th term-exam

Course outline in terms

Academic year (Term)	**4 (2.2)**		**5 (3.1)**		Total	
Weeks	20 1/6		17 2/6			
Types of classes	Cur	Syl	Cur	Syl	Cur	Syl
Lectures	16	16	16	16	32	32
Practical	48	48	48	48	96	96
Classes total	64	64	64	64	128	128
Contact training	64	64	64	64	128	128
Self-study	8	8	44	44	52	52
Control			36	36	36	36
Total	72	72	144	144	216	216

The Syllabus is compiled by:
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The Syllabus
Microbiology, Virology

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 August, 12, 2020. №988)

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 No5.

The Syllabus was approved by the department
Morphology and physiology

Head of Department, Doctor of Medicine, Professor Stolyarov V.V.

1. COURSE OBJECTIVES	
1.1	The aim of Microbiology, Virology in higher medical schools is to form consistent natural science -based world outlook, to master the knowledge of microbe world diversity and their role in common biological processes and in human pa - thologies by developing common cultural and professional competencies. The competencies are aimed at providing sanitary and epidemiological well-being of the population, preservation and improvement of its health.
1.2	The objectives of Microbiology, Virology are: to study the biology of infectious diseases agents and representatives of normal human microflora; to study etiology and usage of microbiological diagnostic methods and medications for spe -cific prevention and therapy.

2. COURSE OVERVIEW	
Course code (in curriculum):	Б1.О.04
2.1	**Assumed background:**
2.1.1	Biochemistry
2.1.2	Normal Physiology
2.1.3	Physics, Mathematics
2.1.4	Human anatomy
2.1.5	Histology, Embryology, Cytology
2.2	**Post-requisite courses and practice:**
2.2.1	Epidemiology
2.2.2	Infectious Diseases
2.2.3	Dermatovenerology
2.2.4	Propaedeutics of Internal Diseases
2.2.5	Obstetrics
2.2.6	Gynecology

3. COMPETENCES UPON COMPLETION OF THE COURSE (MODULE)
GPC-5.1: Demonstrates knowledge and understanding in the sections of fundamental medicine - anatomical, histological structures (anatomy of the human body, structure of organ tissues and their microscopic differentiation), physiological processes (human physiology, mechanisms of regulation of homeostasis, functional body systems in normal)
GPC-5.5: Demonstrates knowledge of the discipline «microbiology» on the structure, physiology of microorganisms, their etiological role in human diseases

By the end of the course students must

3.1	**know:**
3.1.1	- history of Microbiology, Virology, the main stages of the development of these Sciences;
3.1.2	- regulations for safety and work in microbiological laboratories, with reagents and devices, laboratory animals;
3.1.3	- classification, morphology and physiology of microbes and viruses, their biological and pathogenic properties, impact on public health;
3.1.4	- features of process creation of symbiosis between the human body and microbes, the role of resident microflora in the development of opportunistic diseases;
3.1.5	- features of pathogenicity and antibiotic resistance genetic control of microbes, development mechanisms of resistance and ways of its determination;
3.1.6	- the role of individual representatives of the microbial world in the etiology and pathogenesis of major human infectious diseases;
3.1.7	- methods of microbiological diagnostics, application of the main antibacterial, antiviral and biological medications, principles of their preparation and application.
3.2	**be able to:**
3.2.1	- analyze the assessment results of morphofunctional, physiological states and pathological processes in the human body to solve professional problems;
3.2.2	- diagnose the pathogenic agents of parasitic diseases on the specimen, slide, in the photo; perform microbiological and immunological diagnostics.

4. STRUCTURE AND CONTENTS OF THE COURSE (MODULE)						
Class Code	**Topics /Class type**	**Term / Academic**	**Acade mic**	**Competence s**	**Literature**	**Notes**

	Module 1. Morphology of microorganisms					
1.1	The subject and problems of medical microbiology and value of microbiolo-gy at the practical activities of the doc-tor. The basic stages of development of microbiology /Lecture/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
1.2	Lecture. The systematization and no-menclature of microorganisms. The basic groups of bacteria. Toxonomic systems of classification. Morphology and bacterial structure /Lecture/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
1.3	Morphology and bacterial structure. Role of bacterial components of bacte-rial cells in vital activity of bacteria and pathogenesis of infectious diseases /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
1.4	Special methods of staining. Organiza-tion of biological microscope. The types of microscopy. The procedure of the immersion microscopy /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
1.5	Morphology and ultrastructure of par- ticular groups of bacteria: rickettsia, chlamidia, mycoplasma, actinomy-cetes, spirochetes, fungi, protozoa /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
1.6	The main periods in the development of microbiology. Research of L. Pas-teur, R. Koch, I. Mechnikov and their role in foundation of microbiology and the development of world science /Self-control/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
	Module 2. Physiology of microorganisms					
2.1	Bacterial metabolism. Respiration of bacteria. Classification of bacteria ac-cording to type of respiration. Anaer-obes. Anaerobic culture methods of isolating anaerobic pure cultures /Lecture/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.2	Achievements in microbiology. Modern methods of detection of pathogen-specific macromolecules. Detection of nucleic acid sequences: nucleic acid probe tests, polymerase chain reaction /Lecture/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.3	Antibiotics. History of discovery. Role of A. Fleming. Classification. General criteria for effective antibiotic action. General principles of effective antibac-terial therapy /Lecture/	4	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.4	Physiology of bacteria. Nutrient media. Sterilization, asepsis, antisepsis, disin-fection. Methods of cultivation of the microorganisms and isolation of the pure bacterial cultures. Bacteriological method of the diagnostics of infectious diseases /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.5	Physiology of bacteria: nutrition, respi-ration, growth, multiplication, energy metabolism, enzymatic systems of bac-teria. Bacteriological method of diag-nostics of infectious diseases. Identifi-cation of pure cultures of microorgan-isms. Biochemical activity of bacteria. The bacteriological method of diagnos-tics of infectious diseases /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.6	The spread of microbes in the environ-ment. Microflora of water, air, soil. San-itary - bacteriological investigation of objects of environment: water, air, soil. Sterilization, disinfection, and antisepsis. Methods of sterilization /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	

2.7	Normal microbial flora of the human body and its functions. Methods of detection. Dysbiosis. The preparations for correction of normal microflora disorders (probiotics, prebiotics, symbi-otic) /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.8	Genetics of microorganisms. Organiza-tion of the genetic bacterial apparatus. Genotypical and phenotypical varia-tion of microorganisms, its practical significance. Mutations and genetic recombination's. Dissociation in bacteria. Bacteriophag-es. General characteristics. Structure and replication Chemotherapeutical drugs, antibiotics. Determination of sensitivity of micro-organisms to antibiotics /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
2.9	The role of biological factors, such as bacteriophages, enzymes, serum, etc. The relationship of microbes in associa-tions. Quorum sensing bacteria. The ability to form biofilm /Self-control/	4	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
	Module 3. Infectious immunology					
3.1	The study of infections. Dynamics of development of infectious diseases /Lecture/	4	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.2	Immune System. Structure and func-tions. Cells of the Immune System. Classification. Characteristics. Cooper-ation of immunocompetent cells in immune response /Lecture/	4	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.3	Infection. Infectious process. The fac-tors of pathogenicity and virulence of bacteria. Biological method of diagnostics of infectious diseases /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.4	Factors of innate (natural) immunity. Nonspecific defense mechanisms: local and systemic. Complement system. Antigens and antibodies. Serological method of diagnostics of infectious diseases. Antigen-antibody reactions (agglutination reaction, passive hemagglutination reaction) /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.5	Immunity. Antigens and antibodies. Immune System. Structure and func-tions. Cells of the Immune System. Classification. Characteristics. Cooper-ation of immunocompetent cells in immune response. /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.6	Hypersensitivity of delayed type (DTH). Mechanisms. Important char-acteristics of the types of DTH reac-tions. Skin allergic tests /Practice/	4	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.7	The normal human microflora and its role in physiological and pathological processes. Dysbiosis and risk factors /Self-control/	4	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
3.8	/Control/	4	0	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
	Module 4. Gastrointestinal tract infections					
4.1	Fundamentals of Clinical Microbiology. General Principles of bacteriological diagnosis of acute intestinal infections /Lecture/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.2	Pathogenesis and methods of microbio-logical diagnosis of typhoid and para-typhoid /Lecture/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	

4.3	Escherichia, systematic position, gen-eral characteristics. The biological role of Escherichia coli. Molecular mecha-nisms of escherichiosis pathogenesis /Practice/	5	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.4	Characteristics of immunity in typhoid and paratyphoid fever. Salmonella - causative agents of acute gastroenteri-tis. Shigella. Causative agents of dysen-tery, classification, general characteris-tics /Practice/	5	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.5	Microbiological diagnostics of diseases caused by Klebsiella, Yersinia, Methods for food poisoning diagnostics /Practice/	5	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.6	Microbiological diagnostics of diseases caused by Campylobacter and pseu-domonads, biochemical characteristics, antigenic structure, determinants of pathogenicity /Practice/	5	4	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.7	Vibrio cholerae, the systematic position. Classification and general characteris-tics, pathogenicity factors. Biovars. Differentiation from non-cholera vibrio. Pathogenesis of cholera. Methods of microbiological diagnostics /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
4.8	Pseudomonas aeruginosa, general characteristics, pathogenicity factors. Role in human pathology /Self-control/	5	15	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
	Module 5. Purulent-inflammatory diseases					
5.1	Microbiological diagnostics of diseases caused by staphylococci, streptococci, Neisseria /Lecture/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.2	Particularly dangerous infections. Clas-sification mode, basic rules of sam-pling, sending and transportation of infectious material. General principles of diagnosis /Lecture/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.3	Methods of microbiological diagnostics of anaerobic infections /Lecture/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.4	Staphylococci, Streptococci general characteristics. Role in human patholo-gy. Pathogenicity factors and mecha-nisms of pathogenesis of staphylococ-cal infections /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.5	The genus Clostridium. Classification. C. tetani., C. perfringens Taxonomy, general properties, determinants of pathogenicity, toxin production, trans-mission. Epidemiology. Clinical syn-dromes. Laboratory diagnosis. Treat-ment, prevention, and control /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.6	Methods of microbiological diagnosis of diseases caused by mycobacteria and actinomycetes /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.7	Microbiological diagnostics of diseases caused by Corynebacterium, Bordetel-la, haemophiles, legionella, listeria /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.8	Microbiological diagnostics of especial-ly dangerous infections /Practice/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
5.9	Microbiological diagnostics of diseases caused by spirochetes. The family Rickettsiaceae. Classification. General characteristics. Rickettsiosis /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	

5.10	The family Mycoplasmataccae. Gen-eral characteristics. Classification. M.pneumo niae, M.hominis, Ureaplas-ma urealyticum. Pathogenesis and clin-ical disease of mycoplasmosis /Self-control/	5	15	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
	Module 6. Viral infections					
6.1	Viruses. Structure and classification. Reproduction of viruses. Cultivation of viruses. Bacteriophages. Orthomyxovi-ruses (flu virus). Paramyxoviruses (parainfluenza, mumps, measles, res-piratory syncytial virus). Adenoviruses /Lecture/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.2	Parenteral hepatitis viruses: classifica-tion, characteristics. Hepatitis B virus, Hepatitis C virus: pathogenesis, im-munity, etiologic diagnostics, therapy, prevention /Lecture/	5	3	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.3	Orthomyxoviruses. The influenza vi-ruses. Structure. Classification. Patho-genesis and immunity of influenza vi-rus infection. Nonspecific and specific defense mechanisms of anti influenza immunity, treatment, prevention, and control /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.4	Ecological group of arboviruses: defini-tion, classification, characteristics. Ar-bovirus infection: features, pathogene-sis. Tick-borne encephalitis: pathogene-sis, etiologic diagnosis, prevention. Eco-logical arboviruses subgroup. Bunya-viruses, hemorrhagic fever with renal syndrome /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.5	Herpesviruses. Classification. General characteristics. Herpes simplexvirus. Varicella-Zoster virus. Epstein-Barr virus. Cytomegalovirus. Epidemiology. Pathogenesis and clinical syndromes of herpesvirus infections. Laboratory diagnostics. Treatment and immunoprophylaxis /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.6	Picornaviruses. Classification. General characteristics. Biological properties. Antigens. Role in human pathology. Coxsackieviruses. Echoviruses. Epide-miology. Pathogenesis and clinical dis-ease. Laboratory diagnosis. Treatment. Prevention. Hepatitis viruses. Classification. Hepa-titis B virus. General properties. Associ-ated antigens. Epidemiology. Patho-genesis and clinical disease. Laboratory diagnosis. Treatment. Prevention: pas-sive and active immunization /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.7	Retroviruses. Human Immunodeficien-cy viruses (HIV). General characteris-tics. Acquired Immune Deficiency Syn-drome (AIDS). Epidemiology. Patho-genesis. Clinical stages of HIV infec-tion. Laboratory Diagnostics. Treat-ment. Immunoprophylaxis. Oncoviruses /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.8	Clinical microbiology. Microbiological diagnostics of sepsis and purulent infec-tions of the skin /Practice/	5	2	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	

6.9	Prions and slow virus diseases. Structure of cellular and scrapie prion proteins. Resistance to physico-chemical factors. Functions of cellular prion protein. Pathogenic characteristics of scrapie prion protein. Model for proliferation of prions /Self-control/	5	14	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.10	/Control/	5	0	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	
6.11	/Exam/	5	36	GPC-5.1 GPC-5.5	L1.1 L1.2 E1 E2 E3	

5. ASSESSMENT TOOLS

5.1. Assessment tools

Presented by a single document

5.2. Assessment tools for diagnostic assessment

Presented by a single document

6. COURSE (MODULE) RESOURCES

6.1. Recommended Literature

6.1.1. Core

	Authors	Title	Publish, year	Quantity
L1.1	Zverev V.V., Boichenko M.N.	Medical Microbiology, Virology, Immunology : textbook. Vol. 1: учебник	M: GEOTAR-Media, 2020, Electronic resource	2
L1.2	Zverev V.V., Boichenko M.N.	Medical Microbiology, Virology, Immunology : textbook : Vol. 2.: учебник	M: GEOTAR-Media, 2020, Electronic resource	2

6.2. Internet resources

E1	PubMedCentral (PMC)
E2	http://www.viniti.ru/
E3	http://www.medline.ru

6.3.1 Software

6.3.1.1	Operational system Microsoft, applied programs pack Microsoft Office

6.3.2 Information Referral systems

6.3.2.1	"Guarantor", "Consultant plus"

7. MATERIAL AND TECHNICAL SUPPORT OF DISCIPLINE (MODULE)

7.1	The classroom for lecture-type classes, seminar-type classes (laboratory classes), group and individual consultations, ongoing monitoring and intermediate certification is equipped with: a set of specialized educational furniture, a marker (chalk) board, a set of portable multimedia equipment - a computer, a projector, a projection screen, computers with Internet access and access to electronic information and educational environment. Access to the Internet and the electronic information environment of the organization is provided.
7.2	The educational laboratory is equipped with an anaerostat, a PH meter, microscopes, a thermostat, a refrigerator, a centrifuge, electronic scales, analytical scales, a DNA amplifier, an electrophoresis chamber, laboratory utensils, a set of tables and micro-preparations, a computer, a laminar flow cabinet.