

**BURGAS STATE UNIVERSITY "PROF. DR. ASSEN ZLATAROV" –
MEDICAL FACULTY
DEPARTMENT OF ANAESTHESIOLOGY, OBSTETRICS & GYNECOLOGY,
SURGERY, ORTHOPEDICS, TRAUMATOLOGY, UROLOGY, NEUROSURGERY,
EMERGENCY AND INTENSIVE CARE**

Approved by:

DEAN:

/ Prof. Rumyana Yankova, PhD/



SYLLABUS

Discipline:	DISASTER MEDICINE
Specialty:	MEDICINE
Professional field:	7.1 Medicine
Educational qualification degree:	MASTER
Form of training:	REGULAR

Burgas, 2025

EXTRACTS FROM THE CURRICULUM

1. GENERAL PARAMETERS OF THE DISCIPLINE					
Total (academic hours):		60	ECTS:		2
Auditorium classes	Non-auditorium classes		Auditorium ECTS	Non-auditorium ECTS	
45	15		1.5	0.5	
Type of Discipline	Number of hours per week: /lectures + practical session/		Course:	Semester:	
elective	1+2		third	fifth	
2. STUDY FORMS					
Auditorium classes:	Academic hours	ECTS	Non-auditorium classes:	Academic hours	ECTS
Lectures	15	0.50	Consultations	15	0.17
			Individual work with a lecturer	30	1.00
Practical classes	30	1.00	Individual work work on an assignment outside of class	10	0.33
3. ASSESSMENT AND CONTROL					
Forms of assessment and control				Relative share in the total score	
Sessional evaluation: exam				0.4	
Semester (ongoing) assessment:				0.6	
Forms of semester control:					
- Attendance at classes				0.2	
- Active participation in classes				0.3	
- Control works for current control (abstract)				0.5	

ANNOTATION of the discipline "DISASTER MANAGEMENT"

Purpose of the course

The course "Disaster Medicine" is mandatory and is intended for students of the specialty "Medicine", third year, full-time form of education, educational and qualification degree "Master". The course is divided in two modules*¹.

The objectives of the discipline "Disaster Medicine" are related to the opportunity for students to acquire knowledge and practical skills, within the area of the protection and restoration of people's lives, their health and their working capacity as a result of mass damage in disasters. This is knowledge primarily in the field of risk and dangers arising as a result of natural and man-made disasters.

The first module of the course examines issues related to the taxonomy of the basic hazards arising from the creation of disaster situations - natural (earthquakes, floods, etc.) and anthropogenic (ionizing radiation and accidents with the spread of toxic substances, fires and explosions). The main parameters and damaging factors in natural disasters are studied, as well as the behavior and actions of the population that has fallen into the threatened zones of damage during the realization of critical situations. The main physical characteristics, properties and toxic effects on the body of the most frequently used hazardous chemical substances in industry are presented. The issues of the biological effects of ionizing radiation and industrial toxic substances on humans, as well as methods of prevention and protection from them are also examined.

The second module studies the basic principles of medical insurance and the organization of medical care in disaster situations, methods and means of individual and collective protection, methods of providing first aid.

The tasks of the discipline include:

- *basic knowledge of natural and man-made disasters;*
- *taxonomy of hazards arising as a result of critical situations from natural and man-made disasters;*
- *measures to protect the population in the event of critical situations threatening the health and life of the population;*
- *development of critical thinking and a creative approach to decision-making in critical situations.*

Structure of the curriculum content: The study within the discipline includes lectures, practical exercises and tasks for individual work.

Teaching methods and means: Part of the lectures and exercises are presented using multimedia. The exercises are preferably conducted in a specialized classroom. The means for the implementation of the set goals and tasks are audio, computer and communication technologies.

¹ The educational program was developed with the consultation of Colin Meghoo, MD, MSc, FACS, Fulbright specialist grantee at University "Prof.d-r Assen Zlatarov", Burgas, 2024

Forms of training: The study of the discipline is carried out in the following forms:

1. Lectures, in which are given the basic theoretical knowledge on the considered curriculum's topics. For some of the topics and subtopics that can be studied individually by students, the lectures are introductory. They reveal the essence of the issues falling within the scope of the topics and lead the individual work within the recommended literature. In parallel with the lecture material, discussions will be held on theoretical issues, solving tasks related to the practical application of the methods under consideration, solving didactic tests and case studies, etc.

2. Consultations to clarify basic concepts, statistical characteristics, etc. and guidance on their specific features, aimed to overcome the difficulties (if any) within the individual work, etc.

3. Students' individual work is organized through consultations during the lecturers' reception hours, through communication by e-mail, joint work on scientific and professional tasks, covering current tests on a given topic by the lecturer conducting the exercises, etc.

Assessment methods: exam in the discipline, active participation in classes and independent work (0.3), attendance at classes (0.2), preparation of an abstract on a scientific assignment (0.5).

Abstract

The abstract is assigned as a comprehensive assessment of what has been learned so far, including an assessment of the impact of different types of toxic substances and ionizing radiation that have arisen as a result of a disaster situation on the health and safety of people.

Prerequisites for the basic knowledge and skills of students

Students should have knowledge in the field of safety rules and disaster protection, be familiar with the semantic content of the concepts "risk", "danger", "disaster", "first aid" and the Disaster Protection Law of the Republic of Bulgaria. Have the skills to make logical connections between different data, summarize information flows, make deductive analysis and inductive conclusions, and have the attitude and desire to search for additional information, apply logical thinking and demonstrate readiness for action in critical situations.

Expected results:

After successfully completing the course in the discipline, students should know and be able to:

- *identify the main hazards and know the taxonomy by types of impacts on humans, during implementation, by specificity of action, forced and voluntary hazards;*
- *respond adequately to a created disaster situation by providing timely and competent first aid;*
- *possess theoretical knowledge about the toxic effect on the human body of the most commonly used poisonous substances and the biological effect of ionizing radiation, including prevention and protection.*

CURRICULUM CONTENT LECTURES

First module

Subject	hours
Topic 1. Subject and objectives of the discipline. Terminology Classification of disasters. General characteristics of natural disasters. Characteristics of earthquakes. Striking and secondary factors. Characteristics of catastrophic floods and major industrial accidents. Characteristics of the main preventive measures.	2
Topic 2. Physical nature of ionizing radiation. Radiation background – types. Sources of radioactive contamination of the environment. Harmful factors in an accident at a nuclear power plant. Biological effect of ionizing radiation. Pathways for entry of radioactive substances into the body. Prevention and protection.	2
Topic 3. Industrial toxic substances. Basic concepts. Toxicity. Degree of toxic effect. Maximum permissible doses.	1
Topic 4. Toxic effect of poisonous substances with asphyxiating, irritating and generally toxic effects (chlorine, phosgene, carbon monoxide, hydrogen cyanide, ammonia, sulfur and nitrogen oxides). Toxic effect. First aid. Degassing and protection. Substances with nerve effects.	2

Second module

Topic 5. Basic principles and organization of medical insurance in disaster situations. First aid, first medical aid and specialized medical aid. Medical measures in the disaster area	2
Topic 6. Principles and features of the organization of emergency medical care for a large number of victims. Forces and means for medical provision of the population in disaster situations. Medical triage, medical evacuation.	2
Topic 7. Basic principles in the organization of hygienic and epidemiological service to the population in disaster situations. Biological outbreaks of infection and modern bioterrorism - general characteristics, classification and indication. Prerequisites and possibilities for the occurrence of an epidemiological outbreak and a biological infection outbreak, characteristics, principles and measures for protection against biological weapons	2
Topic 8. Biological infection outbreak's elimination measures. Objectives, aims and organization of implementation. Preventive, curative and anti-epidemic measures carried out by official bodies and health services. Forces and means. Organization of isolation and restrictive measures - quarantine and observation. Methods and means of protection against biological agents.	2

TOTAL: 15

PRACTICAL SESSIONS

First module

№	Topic	hours
1	Taxonomy of the main hazards	3
2	Ionizing radiation. Basic dosimetry quantities and units for their measurement	2
3	Decontamination. Safety measures for the consumption of ready-made foods and agricultural products	2
4	Analysis of the radiation situation resulting from an accident at a nuclear power plant	2
5	Analysis of the chemical situation resulting from an industrial accident. Instruments for control and monitoring of chemical pollution.	2
6	Fires - causes of fires. Limitation and elimination of fires. Fire extinguishing agents.	2
7	Evacuation, individual and collective means of protection from the damaging factors in natural and man-made disasters.	2
Second module		
8	Basic principles of medical insurance	2
9	Organization of medical assistance in disaster situations. Activities in the disaster area. Medical triage. Organization and volume of first aid	3
10	Medical evacuation. First aid and specialized medical assistance	2
11	Provision of first aid and transportation of victims with various types of injuries. Methods of temporary hemostasis	4
12	CPR Artificial respiration and external cardiac massage	4
	TOTAL:	30

EXAMINATION QUESTIONNAIRE

1. Subject and objectives of the discipline. Terminology. Classification of disasters.
2. General characteristics of natural disasters. Earthquakes and floods. Main parameters. Damaging and secondary factors. Behavior and actions of the population in the threatened areas of damage.
3. Taxonomy of the main hazards.
4. Ionizing radiation. Main dosimetry quantities and units for their measurement.
5. Radiation background - types. Sources of radioactive contamination of the environment. Damaging factors in the event of an accident at a nuclear power plant.
6. Biological effect of ionizing radiation.
7. Mechanism of radioactive contamination. Radiation damage. Protection.
8. Decontamination. Safety measures for the consumption of ready-made foods and agricultural products.
9. Analysis of a radiation situation that occurred in an accident at a nuclear power plant.
10. Industrial toxic substances. Basic concepts. Toxicity. Degree of toxic effect. Maximum permissible doses.
11. Chemical pollution with chlorine and phosgene. Physico-chemical properties, toxic effect. First aid and protection.
12. Chemical pollution with ammonia and sulfur oxides. Physico-chemical properties, toxic effect. First aid and protection.
13. Chemical pollution with carbon monoxide, hydrogen cyanide, organophosphorus poisonous substances. Physico-chemical properties, toxic effect. First aid and protection.
14. Analysis of the chemical situation resulting from a production accident. Devices for control and monitoring of chemical pollution.
15. Evacuation, individual and collective means of protection from damaging factors in natural and man-made disasters.
16. Basic principles in the organization of medical insurance in disaster situations.
17. First aid, pre-medical aid and specialized medical aid. Medical measures in the disaster area.
18. Principles and features in the organization of emergency medical care, in the case of a large number of victims. Medical triage. Medical evacuation.
19. Basic principles in the organization of hygienic and epidemiological service to the population in disaster situations. Biological outbreak of infection and modern bioterrorism.
20. Occurrence of an epidemiological outbreak and a focus of biological infection. Principles and measures for protection against biological weapons.
21. Measures for the elimination of a focus of biological infection. Prevention, treatment and anti-epidemic measures.
22. Organization of isolation and containment measures - quarantine and observation. Methods and means of protection against biological agents.

RECOMMENDED LITERATURE

1. Rega P., Disaster preparedness and response, Publisher New York, Oxford University Press, 2022
2. Hristo Bozov, Sea medicine rules, Military Medicine academy, 2018
3. Hristo Bozov, Emergency Medicine, Assen Zlatarov ' University Press, 2021
4. Disaster Protection - Basic Rules and Actions in Disaster Situations with Training Models, Sabina Nedkova, Plamena Atanasova, Press: University "Prof. Dr. Assen Zlatarov", Printed by Breeze, ISBN 978-619-7559-64-4, 2025
5. Dragolov, D., Protection of the population from accidents, natural disasters and environmental protection, University of St. Cyril and Methodius, Veliko Tarnovo, 2011.
6. Stefanov, S., M. Kolev, K. Kostadinov Protection of the population from accidents, natural disasters and environmental protection, University of St. Cyril and Methodius, Veliko Tarnovo, 2007.
7. Kamen Kanev and colleagues, Textbook of Medicine in Disaster Situations, University Publishing House "St. Kliment Ohridski", 2017.
8. Oreshkov, T., Hazardous substances, PB at the University "Prof. Dr. Asen Zlatarov", Burgas, 2009.
9. Law on Disaster Protection, published in the State Gazette, issue 102 of December 19, 2006, amended and supplemented by the State Gazette. Issue 60 of July 7, 2020.

ADDITIONAL LITERATURE

1. Berberova R., Natural Disasters in Bulgaria - Status and Trends, New Bulgarian University Publishing House, Sofia2, 2012
2. Law on Protection from the Harmful Effects of Chemical Substances and Mixtures, State Gazette, No. 10 of 04.02.2000.
3. Badinski L., k. GIGOV, K. Dragiev and col. Handbook of Medicine of Disaster Situations (Disasters) and "Krasik Design", Sofia 2007;
4. Romanova Hr. "Medicine of Disasters", Varna, 2007

Compiled by:

(Prof. Dr. Hristo Bozov, MD)

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Assist. Prof. Sabina Nedkova

Approved by a decision of the Council of the Department of Anaesthesiology, Obstetrics & Gynecology, Surgery, Orthopedics, Traumatology, Urology, Neurosurgery, Emergency And Intensive Care, Protocol № 7135/2025

Head of the Department:

(.....)
Associated Prof. N Mirinchev

Approved by a decision of the Faculty Council of the Medical Faculty, Protocol №..... 25/16.06.2025.

Secretary of the Council of the Medical Faculty:

(Chief Assist. Prof. Ruska Nenkova, PhD)

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SYLLABUS

School discipline:	MEDICAL GENETICS
Specialty:	MEDICINE
Professional field	7.1 MEDICINE
Educational and qualification degree:	MASTER
Form of training:	REGULAR

Burgas 2025

EXTRACTS FROM THE CURRICULUM

1. GENERAL PARAMETERS OF THE DISCIPLINE											
Total (academic hours)		90		ECTS:		3					
Auditorium classes		Non-auditorium classes		Auditorium ECTS		Non-auditorium ECTS					
60		30		2		1					
Type of Discipline:		Number of hours per week: /lectures + exercises/		Course:		Semester:					
Mandatory		2+2		III		V					
2. STUDY FORMS											
Auditorium classes:		Hours		ECTS		Non-auditorium classes:		Hours		ECTS	
Lectures		30		1		Consultations (work with a teacher)		6		0,2	
						Independent work: - Preparation of an abstract; - Preparation of exercises.		12		0,4	
Practical Classes		30		1				12		0.4	
3. EVALUATION AND CONTROL											
Forms of evaluation and control								Relative share in the overall assessment			
Sessional Evaluation: Abstract								0.4			
Semester (ongoing) assessment:								0.6			
Forms of Semester control:											
- Presence of Classes								0.25			
- Active participation in the classes - discussions and practical tasks								0.25			
- Protocol protection								0.25			
- Ongoing questioning before each exercise								0.25			

ANNOTATION

on Discipline

"MEDICAL GENETICS"

Purpose of the discipline

Medical Genetics is one of the fastest growing areas in the medical field. Its achievements are important for clinical practice in various fields – Pediatrics, Hematology, Oncology, Neurology, Nephrology, Ophthalmology, endocrinology, cardiology, obstetrics and gynecology, therapy. In the basic course of medical genetics, the mandatory minimum of fundamental and propaedeutic knowledge about the biological nature of hereditary diseases, the peculiarities of their inheritance, etiopathogenetic classification of hereditary diseases and predispositions, as well as the role of environmental factors for the occurrence of germinative and somatic mutations in humans. The main diagnostic and prophylactic approaches in the group of chromosomal diseases and malformations, monogenic and polygenic diseases and hereditary Predispositions. The principles, organization and tasks of the medico-genetic consultation and its relationship with the problems of clinical-genetic polymorphism, approaches and indications for prenatal diagnosis, the organization of and the essence of mass and selective genetic screening and monitoring, such as active form of medico-genetic consultation and prevention of hereditary pathology. For the first time, genetic mechanisms are included in the curriculum for the occurrence of hereditary malignancies, mitochondrial diseases, as well as diseases determined by dynamic mutations. The modernisation of the The program is also related to preimplantation and preconception diagnostics, as well as some novelties in the treatment of genetic diseases - conventional and gene therapy. The program is consistent with the training in fundamental human genetics, which students receive in the biology course by creates basic propaedeutic training on the most frequent and significant hereditary pathology that students will encounter in clinical disciplines. Peculiarity of teaching medical genetics in the Faculty of Medicine of the University "Prof. Dr. Asen Zlatarov" – Burgas is an additional theoretical and practical study dysmorphology, which is characteristic of almost all hereditary diseases, as well as the creation of skills on the part of students to properly differentiate patients and their relatives who need medical-genetic counseling. Through modernization of the educational process in medical genetics is expected doctors to be actively involved in the prevention of hereditary diseases and predispositions by competently directing citizens in need to genetic counselling and assist in the implementation of screening programmes.

Learning of medical genetics is a continuous process that must continue after university education in order to be at European level in the Training.

Main tasks of the school program:

- Acquaintance and acquisition of knowledge about the basics of medical genetics; understanding of the genetic nature of hereditary diseases, hereditary predispositions to diseases due to of somatic mutations.
- Introduction to modern diagnostic methods of medical genetics and algorithm of behaviour.
- Acquisition of skills for active participation in the prevention of hereditary diseases and through competent referral of patients to genetic consultations, assistance in

conducting screening programs, assessment of indications for DNA diagnostics, cytogenetic analysis, prenatal, pre-implantation and postnatal genetic diagnosis.

Expected results:

The expected results of theoretical and practical skills, that students must master when passing the course of study in medical genetics are in the following areas:

- theoretically mastering the basic methods of genetic analysis: genealogical method, ontogenetic method, population-genetic method, cytogenetic method, molecular genetic and molecular-cytogenetic methods;
- Practical application of the indications for genetic testing, prenatal genetic monitoring and screening and short-term tests for mutagenicity - reporting of chromosomal aberrations /HA/, sister chromatid exchanges /WHO/ and micronuclei in binuclear cells;
- skills for construction and genetic analysis of a family tree; determination of genetic risk and genetic prognosis for the next generation; recognition of human chromosomes by groups and their arrangement into a karyotype; karyotype analysis, designation and reading of cytogenetic diagnosis; the use of express methods for cytogenetic analysis - by taking into account X and Y sex chromatin; Preparation of the necessary health documentation to refer patients for medico-genetic counseling and genetic testing.
- How congenital and acquired genetic alterations can lead to the development of malignant tumors and how to identify these can be used for diagnosis, prognosis and prevention of malignant diseases;
- Know the indications, main tasks and the organization of the medical-genetic consultation;
- Use clinical information for searching for various hereditary diseases in the national and international databases
- How the genotype of the patient can be used to development of more effective approaches to maintaining health, for the diagnosis of the disease and individual treatment of each patient;
- Work with medical geneticists in multidisciplinary teams to build a plan for diagnosis and therapy of a genetic disease, and behavior towards the patient.

Methods of teaching: The technology of teaching includes traditional and innovative teaching methods - lectures, talks, discussions, presentations, film screenings, seminars, teamwork and consultations. Along during the exercise, students actively participate, with each member of the group presents, discusses and answers questions on various medico-genetic cases. Clinical thinking and rational choice of indicators for the purpose of correct diagnosis and adequate medical decision.

Forms of Independent work: coursework from abstract type, problems for self-solving on topics from the practical classes, solving tests, colloquia.

Forms of assessment of knowledge: assessment of students' knowledge, a combination of modern and classical methods.

Current control:

- Oral examination before conducting the the practical lesson;

- Solving didactic tests on medical genetics;
- Seminars – discussions;
- Evaluation and certification of the protocols at the end of the exercise;
- Colloquium with test part and oral interrogation.

Semester Exam:

- Practical exam;
- Test;
- Theoretical exam with a written part.

CONTENT OF THE CURRICULUM

LECTURES

Nº	Theme	Hours
1.	Purpose, subject and tasks of medical genetics. Genomics, Proteomics, Metabolomics, Pharmacogenomics. Organization of the human genome. Structure and function of Chromosomes. Chromosomal heteromorphism.	2
2.	Etiology of genetic diseases. Classification of genetic diseases. Mutations in nuclear DNA. Defects in DNA repair. Mutations in mitochondrial DNA. Chromosomal mutations. Pathogenesis of monogenic diseases. DNA mutations that occur affect the structure and function of enzymes, the activity of receptor proteins, collagen structure, spectrin, dystrophin, gene activity involved in tumorigenesis.	2
3.	Diagnostic methods in the medical field genetics. Clinical and genealogical method. Molecular genetic methods. Cytogenetic and molecular-cytogenetic methods.	2
4.	Chromosomal diseases - etiology, pathogenesis, clinic, cytogenetic diagnosis and genetic risk. HD at structural or numerical aberrations of sex chromosomes and autosomes.	2
5.	Monogenic diseases (MB) that are due to the classic type mutations in nuclear DNA. Congenital errors of metabolism (IG). Congenital errors of the human Hemoglobin.	2
6.	MB defined by dynamic mutations. Mitochondrial diseases.	2
7.	Congenital defects of the connective tissue. Hereditary neuromuscular diseases.	2
8.	Hereditary immunodeficiencies Conditions, Diseases associated with a	2

	violation of DNA repair.	
9.	Pharmacogenetics and pharmacogenomics. Definition, genetic nature, classification and diagnosis of pharmacogenetic Disorders. Importance of pharmacogenetic defects for the determination of individual drug dose and for the prevention of adverse drug Reactions.	2
10.	Polygenic diseases. Genetic aspects of some mental, cardiovascular, gastrointestinal and other Diseases.	2
11.	Congenital malformations. Genetic aspects of mental disability.	2
12.	Genetic aspects of malignant diseases. Diseases associated with somatic mutations.	2
13.	Prevention of hereditary Diseases. Medical genetic consultation (MGC) - essence, indications and tasks. Prenatal diagnosis. Preimplantation and preconception diagnostics. Genetic screening. Selective genetic screening. Active screening programs in Bulgaria.	2
14.	Therapy of genetic diseases. Gene therapy of monogenic diseases. Antisense therapy of diseases related to with somatic mutations and viral infections. Therapy of oncological diseases by stimulating the immune system system. Insertion of genes into tumor cells to create sensitivity to medicines.	2 hours
15.	Ethical, Legal and Social Issues of Medical Genetics	2
Total		30 hours

SEMINAR EXERCISES

№	Theme	Hours
1.	Basic methods for genetic analysis of monogenic diseases. Genealogical method.	2
2.	Genealogical analysis to determine the type Main criteria and differential diagnosis of types of inheritance. Deviations from the classical type of inheritance – gonaden mosaicism, dynamic mutations, genomic imprinting, uniparental dysoma, mitochondrial inheritance. Building pedigrees and determining the type of Inheritance.	2
3.	Etiology, pathogenesis, clinic, genetic diagnosis and prevention of monogenic diseases. –genetic methods. Isolation of nucleic acids from biological material. Treatment of peripheral blood with a commercial kit to obtain high molecular weight human DNA. DNA testing to determine the quality of Sample. Methods for detecting known mutations in DNA. Amplification – restriction. Conducting polymerase chain reaction (PCR). Methods for detecting unknown mutations in DNA. DNA sequencing. Monogenic diseases with autosomal dominant type of inheritance - familial	2

	hypercholesterolemia, Marfan syndrome, osteogenesis imperfecta, adult dominant polycystic renal disease. Monogenic diseases of autosomal recessive type inheritance - phenylketonuria; galactosemia; cystic fibrosis; thalassemia and abnormal hemoglobins.	
4.	Monogenic diseases with X dominant type of inheritance - hypophosphatemic vitamin D, resistant rickets. Monogenic diseases with X recessive type of inheritance - hemophilia A and B, progressive muscular dystrophy Duchenne type and Becker type. I colloquium	2
5.	Basic approaches to building a genetic diagnosis and prognosis of chromosomal diseases. Cytogenetic diagnosis. Cytogenetic methods. Principles of cellular cultivation. Treatment of lymphocyte cultures to obtain metaphase Chromosomes. Application of strip techniques for differential staining of Chromosomes. GTG – tape technique; controlled trypsinization of chromosomal preparations and staining with Giemsa paint. Molecular-cytogenetic Methods. Fluorescence in situ hybridization (FISH) Microscopic analysis of the obtained Preparations. Deviations from the normal human karyotype: diagnosis of chromosomal aberrations, determination of genetic risk.	2
6.	Chromosomal diseases - etiology, pathogenesis, clinic, cytogenetic diagnosis and prevention. Chromosomal diseases associated with aberrations of sex chromosomes.	2
7.	Chromosomal diseases associated with aberrations of autosomes. Carotyping of metaphase plates using software. International System of Human Cytogenetic Nomenclature (ISCN). Diagnosis of pathological karyotypes. II colloquium	2
8.	Pharmacogenetic defects (FGD) - etiology, pathogenesis, clinical prevention of adverse drug reactions when carrying FGD. Glucose-6-phosphate dehydrogenase deficiency. Genetic polymorphism of hepatic cytochrome P 450 monooxy-genases.	2
9.	Congenital malformations - monogenic, polygenic and teratogenic. Genetics of the mental insufficiency. Basic diagnostic approaches.	2
10.	Basic approaches to building a genetic diagnosis and prognosis of polygenic diseases - neural tube defects, cleft lips and palate, ischemic disease of the heart, insulin-dependent diabetes mellitus, Alzheimer's disease.	2
11.	Basic approaches to building a Genetic diagnosis and prognosis of diseases associated with somatic mutations: leukemia and lymphoma; breast cancer; colon cancer in the family adenomatous disease and familial	2

	non-polyposis colorectal carcinoma; Sporadic colorectal carcinoma.	
12.	Medico-genetic consultation (MGC) of monogenic, polygenic and chromosomal diseases. Informed consent, the right to information choice, and confidentiality when working with genetic information. Moral, ethical and legal problems of genetic research. Discussion of clinical cases	2
13.	Prenatal diagnosis. Indications for prenatal diagnosis of monogenic and chromosomal diseases. Genetic screening programs.	2
14.	Genetic screening programs.	2
15.	Hereditary predisposition to diseases subject to various clinical specialties: disorders in reproduction, neurological and psychiatric diseases, diseases of the visual and auditory analyzer, internal diseases, skin and malignant diseases blood diseases and immunodeficiency diseases Conditions. Test on the whole material	
Total		30

SYNOPSIS
for an exam in "MEDICAL GENETICS"
for students majoring in "MEDICINE"

1. The place of genetics and genomics in medicine.
2. Organization of the human genome. Structure and function of Genes. Multigenic families. Non-functional DNA sequences Polymorphism.
3. Regulation of gene activity – level control Transcription.
4. Regulation of gene activity – post-transcriptional control.
5. Regulation of gene activity – control at the level translation.
6. Epigenetics – biological and molecular-genetic Aspect.
7. Organization of the mitochondrial genome.
8. Microscopic and submicroscopic structure and function of Chromosomes. Mitochondrial chromosomes.
9. Normal human karyotype. Chromosomal heteromorphism – types and meaning.
10. Mutagenesis. Classification of gene mutations.
11. Gene mutations according to phenotypic expression – with loss of function, with the acquisition of function, dominant-negative mutations.
12. Molecular mechanisms for DNA repair.
13. Chromosomal mutations. Numerical chromosomal aberrations – aneuploidies, mosaicism, polyploidy.
14. Structural chromosomal aberrations – intrachromosomal and interchromosomal rearrangements. Marker chromosomes. Chromosomal fragility and instability.
15. Clinical-genealogical method.
16. Autosomal dominant type of inheritance. Clinical and genealogical criteria. Features and deviations from the classical AD type of Inheritance. Diseases.

17. Autosomal recessive type of inheritance. Clinical and genealogical criteria. Features of AR inheritance type. Diseases.
18. Sex-Related Inheritance - X Recessive and X dominant type of inheritance. Clinical and genealogical criteria. Features of Inheritance. Diseases.
19. Non-traditional (non-Mendeling) inheritance – gonaden and somatic mosaicism, genomic imprinting and uniparental dysoma, inheritance of dynamic mutations, mitochondrial inheritance.
20. Inheritance of chromosomal aberrations
21. Laboratory methods for the diagnosis of monogenic diseases – DNA diagnostics of unknown gene mutations.
22. Laboratory methods for the diagnosis of monogenic diseases – DNA diagnostics of known gene mutations.
23. Microarray methods for expression analysis.
24. Genetic methods for postnatal diagnosis of chromosomal diseases.
25. Monogenic diseases – hemolytic anemias.
26. Congenital metabolic diseases – diseases with disorders of amino acid metabolism.
27. Congenital metabolic diseases – diseases with disorders of carbohydrate metabolism.
28. Diseases with disorders in lipoprotein metabolism.
29. Lysosomal diseases - mucopolysaccharidoses, sphingolipidosis, mucopolipidoses.
30. Hereditary connective tissue diseases and skeletal system.
31. Congenital immunodeficiency diseases.
32. Hereditary neuromuscular diseases - muscular Dystrophy.
33. Monogenic diseases with pulmonary manifestations - cystic fibrosis, alpha-1-antitrypsin deficiency.
34. Hereditary non-syndromic deafness.
35. Hereditary syndromic deafness.
36. Hereditary diseases in dynamic mutations.
37. Mitochondrial diseases.
38. Chromosomal diseases – general characteristics and diagnostics.
39. Chromosomal diseases due to mutations in sex Chromosomes.
40. Chromosomal diseases due to numerical and structural aberrations of autosomes.
41. Syndromes in defects of neighboring genes – syndrome of Prader-Willi, Angelman syndrome, DiGiorgi syndrome.
42. General characteristics of multifactorial diseases.
43. Genetic polymorphism in multifactorial diseases.
44. Genetic predisposition to cardiovascular diseases – coronary artery disease of arterial hypertension.
45. Genetic predisposition to gastrointestinal monogenic diseases – familial adenomatous polyposis and hereditary non-polyposis colon cancer; juvenile polyposis syndrome; syndrome of Peutz-Jeghers; Cowden's syndrome.
46. Genetic factors in endocrine diseases.
47. Genetics of some mental illnesses – schizophrenia and affective disorders.
48. Genetics of some mental illnesses – disease of Alzheimer
49. Genetic predisposition to lung diseases – bronchial asthma, chronic obstructive pulmonary disease.
50. Genetic determination of overweight.
51. Cancer Genetics – General characteristic.
52. General genetic characteristics of hereditary cancer syndromes – polyposis and non-polyposis colorectal carcinoma, breast and ovarian cancer, familial melanoma, multiple endocrine neoplasia.

53. Dismorphology and teratogenesis.
54. Developmental abnormalities under teratogenic influences.
55. Mental retardation.
56. Genetic causes of infertility.
57. Prenatal diagnosis of monogenic and chromosomal diseases – indications, invasive and non-invasive approaches.
58. Screening programs – general provisions, mass screening in newborns and pregnant women.
59. Selective screening for the detection of heterozygous carriage of recessive mutations.
60. Medical and genetic consultation.
61. Pharmacogenetics.
62. Pharmacogenomics.
63. Biology of targeted therapy.
64. Targeted therapy for cancer of: mammary gland, lung liver, colon and chronic myelogenous leukemia.
65. Genetic aspects of predictive medicine.

LITERATURE FOR PREPARATION

Main:

1. Medical Genetics and Genomics. Edited by Corr. Prof. Draga Toncheva and Prof. Savina Hadzhidekova. ARSO Medical Publishing House, Sofia Aug. 2020 ISBN: 978-197-057-5
2. Genomic Medicine Part I and II. Edited by Prof. D. Prof. Toncheva and Prof. V. Ganey ed. Simmelpres, 2015. ISBN: 978-619-183-015-2
3. Medical Genetics Practical Guide for Students Medics. Edited by Corresponding Member, Prof. D. Toncheva and Prof. Dr. Savina Hadzhidekova. Ed. ARSO, Sofia, 2020, ISBN: 978-619-197-052-0
4. Color atlas of Geneticsq 4th ed., E. Passarage. ISBN: 978-313-100-364

Additional:

1. Valkanova, M. Legal Aspects of Genetic Research. Legal Thought, 2008, No 2, 101-116.
2. **B. Popov.** Basic principles and approaches of medical genetic prophylaxis. Textbook for general practitioners. KOTA Publishing House Stara Zagora, 2018, ISBN 978-954-305-462-6
3. **B. Popov.** *Didactic tests on medical genetics*. Textbook for students. KOTA Publishing House, Stara Zagora, 2012 ISBN 978-954-305-343-8.
4. Kovacheva K., (2016). Congenital anomalies: clinical-dysmorphological and genetic Problems. IC MU - Pleven Publishing House ISBN: 978-956-756-189-2
5. Delivery M., (2013). Genetic Discrimination. Sibi Publishing House ISBN: 978-954-730-852-7

6. Dimitrova I., (2012). Prenatal Diagnostics and Biopolitics in Bulgaria. East-West Publishing House ISBN: 978-954-321-125-8

7. Dagan P., (2010). Congenital Anomalies in Clinical Practice. "Medicine and Physical Education", Sofia ISBN: 978-954-420-280-4

Compiled by:.....

(Assoc. Prof. Dr. Borišlav Popov, MD)

The curriculum was also discussed at the meeting of the Department of Physiology, Pathophysiology, Medical Genetics, Parasitology, Clinical Laboratory and immunology", protocol No. of
.....

Head of Department:

(Prof. Petya Tsvetkoova, DSc)

The curriculum was adopted and discussed at the Faculty Council, Protocol No. 23. from 16.04.2020.

Scientific Secretary of the FS: ..

(Chief Assistant Dr. Ruska Nenkova)

UNIVERSITY "PROF. D-R ASSEN ZLATAROV" - BURGAS
FACULTY OF MEDICINE
DEPARTMENT "CHEMISTRY, BIOCHEMISTRY, BIOLOGY,
MICROBIOLOGY"

Approved by:

DEAN:

(Prof. Rumyana Yankova, PhD)

SYLLABUS

Academic discipline:	MICROBIOLOGY
Specialty:	MEDICINE
Field of higher education::	7.1. MEDICINE
Education and qualification degree:	MASTER
Form of education:	REGULAR

Burgas, 2025

1. GENERAL PARAMETERS OF DISCIPLINE					
Total (academic hours)::		240		ECTS: 8	
Auditorium classes	Non-auditorium classes		Auditorium ECTS	Non-auditorium ECTS	
135	105		4.5	3.5	
Type of subject:	Number of hours per week: (lectures + practicals)		Course:	Semester:	
Mandatory	2+2/2+3		II и III	IV и V	
2. STUDY FORMS					
Auditorium classes:	Academic hours	ECTS	Non-auditorium classes:	Academic hours	ECTS
Lectures	60	2	Consultations	60	2
Seminars	15	0.5	Work with a teacher		
Practical sessions	60	2	Self- study work		
			- preparation of exercises;	25	0.9
			- preparation for participation in discussions;	10	0.3
			- work with information sources.	10	0.3
3. ASSESSMENT AND CONTROL					
Assessment and Control Forms				Relative share in the total score	
Session Assessment: Exam				0.4	
Semester (Ongoing) Assessment:				0.6	
Forms of semester control:					
- Attendance in classes				0.25	
- Active participation in Educational/Scientific activities				0.25	
- Ongoing control (colloquium, tests)				0.5	

ANNOTATION

The academic discipline "Mycobiology" is obligatory for students of the specialty "Medicine," second and third year, full-time form of study.

Aims and objectives

Students will learn more about:

- Morphology, physiology, and genetics of microorganisms;
- Antimicrobial agents and chemotherapy, main groups of antimicrobial agents, mechanisms of antibiotic Resistance;
- Role of environmental factors, Decontamination, Disinfection, and Sterilization,
- Principles of the occurrence and stages of infection;
- Host-resistance mechanisms- natural resistance and acquired immunity, principles of immunoprophylaxis and immunotherapy of infectious diseases;
- Main characteristics of bacterial, viral, and mycotic causative agents of infectious diseases;
- Laboratory diagnosis of bacterial, viral, and mycotic infections;

The objectives are aligned with the credit rating of the discipline and the qualification characteristics of the specialty.

Structure of learning content

- Section "General Microbiology"
- Section "Infection and Immunity"
- Section "Bacteriology"
- Section "Virology"
- Section "Clinical Microbiology"

Teaching methods

- Traditional (passive) methods: presentation of the study material through a lecture, demonstration, and good laboratory practices
- Modern (interactive) methods: discussion, problem-based learning, consistent work in small groups throughout the semester and the academic year
- Digital technologies: online education and multimedia tools (audio and video materials)

Forms of self-study

- Case studies for resolution on topics from the practical lessons
- Presentations by sections of the learning content
- Tests on sections of the learning content

Assessment methods

- Ongoing assessment from seminar classes, tests and colloquiums
- Final assessment by test and written exam on the examination questionnaire

Previously Basic knowledge and skills of the students

Students should have a good basic knowledge of biology, chemistry, and physics.

Expected results:

1. Theoretical knowledge – to know:
- Morphology, physiology, and genetics of the main groups of microorganisms;

- Methods of sterilization and disinfection;
- The effects of antimicrobial agents and resistance mechanisms;
- The regularities of the infectious process;
- Basic knowledge of immunity, immunoprophylaxis, and immunotherapy;
- The human microbiome and its importance;
- The characteristics of the most important microorganisms for human pathology.

2. Practical skills:

- Collection and transportation of clinical and other materials for microbiological research;
- Microscopic preparations and observation of preparations with a light microscope;
- Identification of clinically significant microorganisms based on cultural, physiological, biochemical, and other characteristics;
- Preparation and interpretation of antibiograms;
- Analysis of basic immunological and genetic tests;
- Interpretation of results of microbiological diagnostics.

CURRICULUM CONTENT

LECTURES	Hours
1. Subject, tasks, divisions and historical development of microbiology. Main groups of microorganisms. Subject, goals, tasks and historical development of microbiology. Taxonomy of microorganisms. Main groups of microorganisms. Comparative characterization of eukaryotic and prokaryotic cells.	2
2. Morphology and structure of microorganisms: bacteria, fungi and viruses. Morphology of bacteria: size, shape and mutual arrangement, surface/volume ratio. Bacterial cell structure: essential and non-essential cell organelles. Fungi morphology and structure. Morphology and structure of viruses.	2
3. Physiology of bacteria. Chemical composition. Basic life processes. Cultivation. Chemical composition of bacteria. Feeding, breathing, growth and reproduction of bacteria. Cultivation of the bacteria (in vitro).	2
4. Genetics of microorganisms. Bacterial chromosome. Extrachromosomal genetic elements. Bacteriophages. Bacterial mutations. Basic mechanisms of genetic recombination in bacteria - conjugation, transduction, transformation. Genetic engineering.	2
5. Influence of environmental factors on microorganisms. Sterilization and disinfection. Influence of physical factors. Influence of chemical factors. Influence of biological factors. Sterilization, disinfection and antiseptics. Control methods.	2

6. Antimicrobial chemotherapy. Basic concepts. Classification of antibiotics. 2

Antimicrobial agents. Selective toxicity. Mechanisms of Antibiotic Action. Basic properties and requirements for antibiotics. Chemotherapy index. Chemotherapy window. Classification of antibiotics according to their mechanism of action. Inhibitors of cell wall synthesis.

7. Antimicrobial chemotherapy. Classification of antibiotics. Antimycotic and antiviral agents. 2

Inhibitors of protein synthesis. Inhibitors of nucleic acid synthesis. Inhibitors of cytoplasmic membrane function. Antimycotic agents. Antiviral agents.

8. Antimicrobial chemotherapy. Drug resistance. 2

Bacterial resistance. Types of bacterial resistance. Genetic and biochemical basis of bacterial resistance. Antibiotic selection and affecting factors. Antibiotic combinations. Antibiotic prophylaxis. Management of antibiotic use. Antimycotic and antiviral resistance.

9. Infection. Basic concepts. Epidemic process.

Host-pathogen interactions. Infection, infectious process, infectious disease. 2
Reservoir of the causative agent of infection. Mechanisms of infection transmission. Entry of the causative agent of infection. Spread of infection in the body. Stages of a typical acute infectious disease. Forms of the infectious process.

10. Infection. Role of microorganisms, macroorganism and the external environment in the infectious process.

Role of microorganisms in the infectious process: infectivity, pathogenicity, 2
virulence and contagiousness. Factors of pathogenicity and virulence of microorganisms: adhesion and colonization, invasion, toxins, enzymes, factors affecting the mechanisms of natural resistance, factors affecting the mechanisms of immunity. The role of the macroorganism in the development of the infectious process. The role of the environment in the development of the infectious process.

11. Immunity. Basic concepts. Natural resistance. Antigens. Antigenic structure of the bacterial cell.

Natural resistance (innate immunity): protective function of skin, mucous 2
membranes and normal microbiota; humoral factors; cellular factors; acute inflammation. Toll-like receptors. Antigenic structure of the bacterial cell. Properties of antigens

12. Immunity. Immunocompetent cells. Immune response. 2

Immunocompetent cells: T- and B-lymphocytes, natural killers, macrophages. Major tissue compatibility complex. Immune response - stages. Humoral and cellular immune response. Types of immunity: innate and acquired, active and passive, natural and artificial, systemic and local. Immunoglobulins.

13. Hypersensitivity of the fast and fun type. Autoimmune reactions and diseases. Immunodeficiency states. 2

Types of allergic reactions according to the classification of Coombs and Geel: Type I (anaphylactic hypersensitivity). Anaphylactoid reactions. Anaphylaxis and atopy. Desensitization; Type II (cytotoxic hypersensitivity); Type III (hypersensitivity in-

duced by immune complexes). Serum sickness; Type IV cell-mediated (delayed) hypersensitivity. Mechanisms for loss of tolerance. Autoimmune diseases. Immunodeficiency conditions – primary and secondary.

14. Specific prevention and therapy of infectious diseases. Vaccines, immune serums and immunomodulators. 2

Basic concepts. Types of vaccines: live, killed, chemical, toxoids containing nucleic acids and viral vector vaccines. Immunization calendar of the Republic of Bulgaria. Immune sera: heterologous and homologous. Other antibody-containing preparations: normal human gamma globulin, human specific immunoglobulins, monoclonal antibodies. Immunomodulators: immunostimulators and immunosuppressants.

15. Normal microbiota of the human body. Pathogenic fungi. Causative agents of opportunistic mycoses. 2

Genus *Candida*. Genus *Cryptococcus*. Genus *Aspergillus*.

16. Gram-positive cocci: staphylococci, streptococci, enterococci. 2

Genus *Staphylococcus*. *S. aureus*, *S. epidermidis*, *S. saprophyticus*, *S. lugdunensis*. Genus *Streptococcus*. *S. pyogenes*, *S. agalactiae*, *S. pneumoniae*, group of greening streptococci. Genus *Enterococcus*. *E. faecalis*, *E. faecium*.

17. Gram-negative cocci. Most popular. Moraxelli. Gram-negative pleomorphic bacteria. Hemophilic. Bordeteli. 2

Genus *Neisseria*. *N. meningitidis*. *N. gonorrhoeae*. Род *Moraxella*. *M. catarrhalis*. Genus *Haemophilus*. *H. influenzae*. Род *Bordetella*. *B. pertussis*.

18. Order Enterobacterales. Conditionally pathogenic intestinal bacteria – Escherichia coli, Klebsiella-Enterobacter-Serratia, Proteus-Providencia-Morganella etc. 2

General characteristics of intestinal bacteria. Genus *Escherichia*. *E. coli*. Genus *Klebsiella*. Genus *Enterobacter*. Genus *Serratia*. Genus *Proteus*. Genus *Providencia*. Genus *Morganella*.

19. Order Enterobacterales. Pathogenic intestinal bacteria: Shigella, Salmonella, Yersinia. 2

Genus *Shigella*. *S. dysenteriae*, *S. flexneri*, *S. boydii*, *S. sonnei*. Genus *Salmonella*. Causes of typhoid-paratyphoid diseases and food poisoning. Genus *Yersinia*. *Y. enterocolitica*. *Y. pestis*.

20. Genus Pseudomonas and other non-glucose-fermenting Gram-negative bacteria. 2

Genus *Pseudomonas*. Genus *Burkholderia*. Genus *Stenotrophomonas*. Genus *Acinetobacter*.

21. Listeria. Corynebacteria. Mycobacteria. 2

Genus *Listeria*. *L. monocytogenes*. Genus *Corynebacterium*. *C. diphtheriae*. Genus *Mycobacterium*. *Mycobacterium tuberculosis* complex. Other mycobacteria..

22. Obligate anaerobic spore-forming clostridia. Non-spore forming obligate 2

anaerobic bacteria.

Genus *Clostridium*. *C. tetani*. *C. botulinum*. *C. perfringens*. *C. difficile*. Non-spore forming anaerobic bacteria. Gram-negative rods and cocci. Gram-positive rods and cocci.

23. Aerobic spore-forming bacteria. Vibrios. 2

Genus *Bacillus*. *B. anthracis*. Genus *Vibrio*. *V. cholerae*.

23. Spirils. Spirochetes. 2

Genus *Campylobacter*. *C. jejuni*, *C. coli*, *C. fetus subsp. fetus*. Genus *Helicobacter*. *H. pylori*. Genus *Treponema*. *T. pallidum*, Genus *Borrelia*. *B. burgdorferi* complex. Род *Leptospira*. *L. interrogans*.

24. Mycoplasma. Chlamydia. Rickettsia 2

Genus *Mycoplasma*. Genus *Ureaplasma*. Genus *Chlamydia*. Genus *Chlamydophila*. Genus *Rickettsia*. Genus *Coxiella*.

25. Viruses. General characteristics. The role of viruses in human pathology. 2

General characteristics. Classification of viruses. Reproduction of viruses. Methods used in virology. The role of viruses in human pathology.

26. Picornaviruses. Orthomyxoviruses. Paramyxoviruses. Rubella virus. 2

Family *Picornaviridae*. Polio viruses. Cocksackie and ECNO viruses. Rhinoviruses. Family *Orthomyxoviridae*. Influenza viruses. Family *Paramyxoviridae*. *Human parainfluenza virus*. *Mumps virus*. *Measles virus*. *Respiratory syncytial virus*. *Rubivirus rubellae*.

27. Coronaviruses. Herpes viruses. Adenoviruses. Poxviruses.

Family *Coronaviridae*. SARS-CoV, MERS-CoV, SARS-CoV-2. Family 2
Herpesviridae. *Herpes simplex virus*. *Varicella zoster virus*. *Epstein-Barr virus*. *Cytomegalovirus*. Adenoviruses. Causative agents of smallpox and monkeypox.

28. Togaviruses. Flaviviruses. Bunyaviruses. Filoviruses. Rhabdoviruses. 2

Togaviruses - Genus *Alphavirus*. Flaviviruses – causative agents of Yellow fever, Dengue, Zika, West Nile fever, Japanese encephalitis, tick-borne encephalitis. Bunyaviruses – causative agents of Crimean-Congo hemorrhagic fever and Hemorrhagic fever with renal syndrome. Filoviruses – Ebola and Marburg. Rhabdoviruses – the causative agent of rabies.

29. Rotaviruses and noroviruses. Parvoviruses. Human papillomaviruses. 2

Genus *Rotavirus*. Genus *Norovirus*. *Parvovirus B19*. *Human papillomavirus*.

30. Retroviruses. Hepatitis viruses. 2

Family. *Retroviridae*. AIDS viruses. Causes of hepatitis: *Hepatitis A virus*, *Hepatitis B virus*, *Hepatitis C virus*, *Hepatitis D virus*, *Hepatitis E virus*.

Total: 60

PRACTICAL LESSIONS

TOPIC	Hours
1. Microbiological laboratories. Morphology of microorganisms. Microscopic research methods. Methods for observation of microorganisms in the unstained state. Methods for observation of microorganisms in a stained state. Simple staining techniques.	2
2. Morphology of microorganisms. Microscopic research methods. Methods for observation of microorganisms in a stained state. Complex staining techniques. Gram staining of the cell wall. Staining of volutin inclusions by Neisser's method.	2
3. Morphology of microorganisms. Microscopic research methods. Methods for observation of microorganisms in a stained state. Complex staining techniques. Staining of acid-fast bacteria by Zill-Nielsen's method. Staining of spores by Möller's method.	2
4. Physiology of microorganisms. <i>In vitro</i> cultivation and isolation methods. Techniques of microbiological cultivation and screening. Observation of bacterial growth in liquid and on solid media. Demonstration of atmospheric air thermostat and anaerobic culture jar.	2
Test "Morphology of Microorganisms"	
5. Physiology of microorganisms. Bacterial metabolism. Bacterial enzymes. Biochemical methods for the identification of bacteria. Automated systems for bacterial identification.	2
6. Physiology of microorganisms. Growth and reproduction. Methods for determination of the number of bacteria. Methods for sanitary microbiological examination of water, air, hospital environment.	2
7. Genetics of microorganisms. Seminar. Bacteriophages. Molecular genetic methods. Hybridization methods: types, applications. Amplification methods: types, applications. Sequencing: types, applications. Genetic engineering: stages, applications.	2
Test "Physiology of Microorganisms"	
8. Influence of physical, chemical and biological factors on microorganisms. Sterilization and disinfection. Determination of optimum temperature of growth. Buchner's experience. Study of the influence of heavy metals (oligodynamism). Agar method. Dry sterilization system, an autoclave and laminar box with UV lamp. Disinfectants and Antiseptics	2
9. Antimicrobial chemotherapy. Laboratory methods for determination of drug resistance of bacteria to antimicrobial agents. Bauer-Kirby agar diffusion method. Preparation and analysis of antibiogram. Determination of the minimum inhibitory concentration and the minimum bactericidal concentration of antibiotics.	2

10. Colloquium.

General Microbiology Section

11. Infection. Factors of pathogenicity in microorganisms. Seminar.

2

Pathogenicity factors of selected species of bacteria, fungi and viruses.

12. Immunity. Immune reactions. Seminar.

Agglutination reactions. Precipitation reactions. Complement binding reaction. Immunofluorescence method - direct and indirect. Immunoenzymatic method (ELISA) – direct, indirect, sandwich, competitive. Immunochromatographic method. Immunoblot (Western blot).

2

13. Vaccines and serums. Immunomodulators.

Immunization calendar of the Republic of Bulgaria. Vaccines and Serums collection. "Immunomodulators" collection.

2

Test "Infection and Immunity"

14. Collection, transport and processing of microbiological materials research. Basic principles of microbiological diagnostics.

Basic rules for taking, transporting and processing materials for microbiological research. Course of the microbiological examination: direct microscopic preparation; initial crops; isolation and identification of pure cultures by biochemical examination and determination of antigenic composition. Antibiotic susceptibility testing. Serological examination. Demonstration of specific genes with molecular biological methods.

2

15. Microbiological diagnosis of infections caused by fungi.

Genus *Candida*. Genus *Cryptococcus*. Genus *Aspergillus*. Clinical cases.

2

16. Microbiological diagnosis of staphylococcal and streptococcal infections.

Microbiological examination of pus. Clinical cases.

3

17. Microbiological diagnosis and differential diagnosis bacterial meningitis

(*Neisseria meningitidis*, *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Streptococcus agalactiae*, *Listeria monocytogenes*, etc.).

3

Microbiological examination of cerebrospinal fluid. Clinical cases.

18. Microbiological diagnosis of uroinfections: intestinal bacteria (*Escherichia coli*, *Klebsiella-Enterobacter-Serratia* and *Proteus-Providencia-Morganella*), non-fermenting glucose bacteria (*Pseudomonas* spp.), Gram-positive cocci (*Enterococcus* spp., *Streptococcus* spp., *Staphylococcus* spp.).

3

Microbiological examination of urine. Clinical cases.

19. Microbiological diagnosis of bacterial dysentery, salmonellosis, colienteritis and yersiniosis. Microbiological diagnosis of infections caused by *Helicobacter pylori*, *Campylobacter* spp., *Clostridioides difficile*.

3

Microbiological examination of feces. Clinical cases.

20. Microbiological diagnosis of diphtheria and whooping cough.	3
Microbiological examination of materials from the upper respiratory tract. Clinical cases.	
21. Microbiological diagnosis of tuberculosis.	3
Microbiological examination of lower respiratory tract. Clinical cases.	
22. Microbiological diagnosis of high-risk infections (especially dangerous infections). Seminar.	3
The causative agent of leprosy is <i>Mycobacterium leprae</i> . <i>Brucella</i> . Cause of tularemia – <i>Francisella tularensis</i> . <i>Y. pestis</i> . <i>Vibrio cholerae</i> . <i>Anthrax bacillus</i> .	
23. Microbiological examination of materials from the genital system. Microbiological diagnosis of causes of sexually transmitted infections: <i>Neisseria gonorrhoeae</i>, <i>Treponema pallidum</i>, <i>Chlamydia</i>, <i>Mycoplasmas</i>, <i>Candida albicans</i>, <i>Bacterial vaginosis</i>, <i>Nonspecific balanitis</i>.	3
Microbiological examination of vaginal secretion, cervical secretion, urethral secretion, ejaculate. Clinical cases.	
24. Microbiological examination of the cardiovascular system. Causes of septic conditions: unconditionally pathogenic (<i>Salmonella Typhi</i>, <i>Brucella spp.</i>, <i>Borrelia spp.</i>) and conditionally pathogenic. Problem microorganisms causing nosocomial infections (<i>Pseudomonas spp.</i>, <i>Enterococcus spp.</i>, <i>Methicillin-resistant Staphylococcus aureus (MRSA)</i>, <i>C. difficile</i>).	3
Microbiological examination of blood for blood culture. Clinical cases.	
25. Microbiological diagnosis of wound infections. Classification of wounds.	3
Major groups of aerobic and anaerobic bacteria causing wound infections. Surgical wound infections. Specific wound infections - anthrax, diphtheria, clostridial myonecrosis, tuberculosis. Infections of the skin and subcutaneous tissue. Bone and joint infections.	
Microbiological examination of wounds. Clinical cases.	
26. Colloquium.	3
Bacteriology Section.	
27. Microbiological diagnosis of infections caused by respiratory viruses.	3
Orthomyxoviruses. Coronaviruses. Clinical cases.	
28. Microbiological diagnosis of infections caused by intestinal, hepatotropic, neurotropic and dermatotropic viruses. Seminar.	3
29. Microbiological diagnosis of infections caused by sexually transmitted viruses, congenital viruses, oncogenic viruses and by bloodsuckers.	3
Clinical cases.	
30. Microbiological diagnosis of viral infections.	3
Test " Virology"	
Total:	75

EXAM QUESTIONNAIRE

1. Subject, tasks, divisions and historical development of microbiology. Taxonomy of bacteria. Introduction to General Microbiology.
2. Morphology of bacteria. Bacterial cell structure - cell wall.
3. Structure of the bacterial cell - cytoplasmic membrane, nucleoid, ribosomes, cytoplasm, capsule, slime, cilia, pili, granules, spores.
4. Morphology and structure of fungi. Morphology and structure of viruses.
5. Chemical composition of the bacterial cell. Eating. Breathing.
6. Growth and reproduction. Cultivation of the bacteria.
7. Bacterial chromosome. Extrachromosomal genetic elements.
8. Bacterial mutations. Genetic recombination.
9. Bacteriophages.
10. Hybridization methods: types, applications. Amplification methods: types, applications.
11. Sequencing: types, applications. Genetic engineering: stages, applications.
12. Influence of external environmental factors on microorganisms: physical, chemical and biological. Sterilization and disinfection control methods.
13. Sterilization. Disinfection. Antiseptic.
14. Antimicrobial chemotherapy. Basic concepts. Classification.
15. Cell wall synthesis inhibitors.
16. Inhibitors of protein synthesis. Inhibitors of nucleic acid synthesis.
17. Antimicrobial agents damaging the function of the cytoplasmic membrane - antibacterial and antifungal. Other antifungal agents.
18. Antiviral agents.
19. Mechanisms of bacterial resistance. Choice of antibiotic. Resistant bacteria. Antibiotic combinations. Antibiotic prophylaxis.
20. Characteristics and forms of the infectious process.
21. Factors for the occurrence and development of the infection. Role of the microorganism, the macroorganism and the external environment.
22. Natural resistance. Protective function of skin, mucous membranes and normal microbiota; humoral factors; cellular factors and acute inflammation. Toll-like receptors.
23. Antigens. Properties of antigens. Types of antigens.
24. Immune system. Organs, tissues, cells and their products. Immune response.
25. Immunity. Types of immunity. Immunoglobulins.
26. Allergy. Hypersensitivity of the fast and fun type. Autoimmune reactions and diseases. Immunodeficiency states.
27. Vaccines. Serums and other antibody-containing preparations. Immunomodulators.
28. Immune reactions and their application in the diagnosis of infectious diseases.
29. Normal microbiota.
30. Staphylococci.
31. Streptococci. Beta-hemolytic streptococci.
32. Streptococci. Alpha-hemolytic streptococci. Enterococci.
33. Meningococci and gonococci. Genus *Moraxella*.
34. Hemophilia. *Bordetella*.
35. Intestinal bacteria: general characteristics. *Escherichia coli*. Conditionally Pathogenic Gut Microbes: *Klebsiella-Enterobacter-Serratia, Proteus-Providencia-Morganella* etc.
36. Pathogenic intestinal bacteria - Genus *Shigella*, Genus *Salmonella*

37. Genus *Yersinia* – *Yersinia enterocolitica*. *Y. pestis*.
38. Genus *Pseudomonas* and other non-glucose-fermenting Gram-negative bacteria.
39. Genus *Listeria*. Genus *Corynebacterium*
40. Genus *Mycobacterium* – MTB and NTB mycobacteria.
41. *Mycobacterium leprae*. Genus *Brucella*
42. Genus *Francisella* – *Francisella tularensis*. Genus *Legionella*.
43. Genus *Clostridium* – *Clostridium perfringens*, *C. tetani*, *C. botulinum*, *C. difficile*.
44. Non-sporulating anaerobic bacteria. Gram-negative rods and cocci. Gram-positive rods and cocci.
45. Gram-positive spore-forming aerobic bacteria - *Bacillus anthracis*.
46. Genus *Vibrio* - *Vibrio cholerae*
47. Genus *Helicobacter* - *Helicobacter pylori*, Genus *Campylobacter*
48. Genus *Treponema*– *Treponema pallidum*.
49. Genus *Borrelia* - *Borrelia recurrentis*. The causative agent of Lyme disease is *Borrelia burgdorferi* complex. Causes of leptospirosis.
50. Genus *Mycoplasma*. Genus *Ureaplasma*.
51. Genus *Chlamydia*. Genus *Chlamydophila*.
52. Genus *Rickettsia* - *R. prowazekii*, *R. conorii*, *C. burnettii*, *B. henselae*.
53. Pathogenic fungi. Genus *Candida*. Genus *Aspergillus*. Genus *Cryptococcus*.
54. Viruses - nature and properties.
55. Family *Picornaviridae*. Genus *Enterovirus* - poliomyelitis, *Coxsackie*, ECNO, rhinoviruses.
56. Family *Orthomyxoviridae*. *Influenza*.
57. Family *Paramyxoviridae* – Human parainfluenza virus. Mumps virus. Measles virus. Respiratory syncytial virus. Rubivirus rubellae.
58. Coronaviruses – SARS-CoV, MERS-CoV, SARS-CoV-2.
59. Family *Herpesviridae*. Herpes simplex virus. Varicella zoster virus. Epstein-Barr virus. Cytomegalovirus.
60. Adenoviruses. Poxviruses - smallpox, monkeypox.
61. Togaviruses - Genus *Alphavirus*. Flaviviruses –Yellow fever, Dengue, Zika, West Nile fever, Japanese encephalitis, tick-borne encephalitis. Bunyaviruses –Crimean-Congo hemorrhagic fever and Hemorrhagic fever with renal syndrome.
62. Filoviruses – Ebola and Marburg. Rhabdoviruses – the causative agent of rabies.
63. Genus *Rotavirus*. Genus *Norovirus*. Parvovirus B19. Human papillomavirus.
64. Hepatitis virus– HAV, HBV, HCV, HDV, HEV.
65. Family *Retroviridae*. AIDS.

REFERENCES

Mandatory

1. Medical microbiology textbook for students of medicine, dentistry and pharmacy. Edited by Ivan Mitov. 2024. ISBN: 987-619-197-088-9.
2. Manual for practical exercises in medical microbiology – part I. Edited by Ivan Mitov. 2022. ISBN 978-619-197-074-2.
3. Manual of practical exercises in medical microbiology – part II. Edited by Ivan Mitov. 2020. ISBN 978-619-197-034-6.

Recommended

1. Levinson's Review of Medical Microbiology and Immunology: A Guide to Clinical Infectious Disease. 18th Edition, 2024. Peter Chin-Hong, Elizabeth A. Joyce, Manjiree Karandikar, Mehrdad Matloubian, Luis Alberto Rubio, Brian S. Schwartz, Warren E. Levinson. ISBN: 978-126-512-600-1.
2. Medical Microbiology. 9th Edition, 2020. Patrick R. Murray, Ken Rosenthal, Michael A. Pfaller. ISBN: 978-032-367-322-8.
3. Medical Microbiology. 24th Edition, Lange, 2007. Jawetz, Melnic, Adelberg. ISBN: 978-007-147-666-9.

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Approved by a decision of the Council of the Department of "Chemistry, Biochemistry, Biology and Microbiology", Protocol №2 /09.01.2025

Head of department:

...
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Approved by a decision of the Faculty Council of the Medical Faculty, Protocol № 18/13.01.2025

Secretary of the Council of the Medical Faculty:

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BURGAS STATE UNIVERSITY "PROF. DR ASSEN ZLATAROV"
FACULTY OF MEDICINE

**DEPARTMENT OF ANATOMY, HISTOLOGY AND EMBRYOLOGY,
PATHOLOGY, FORENSIC MEDICINE AND DEONTOLOGY**

Approved by:

DEAN

/Prof. Rumyana Yankova-Avramova/

CURRICULUM

Course Title:	GENERAL PATHOLOGY
Degree Programme:	MEDICINE
Professional Field	7.1 MEDICINE
Educational Qualification Degree:	MASTER
Form of Education:	FULL-TIME

Burgas, 2026

EXTRACTS FROM THE CURRICULUM

1. GENERAL PARAMETERS OF THE COURSE					
Total workload (hours):		180		Credits:	
Contact hours:		Independent (self-directed) study hours:		Contact workload	
105		75		3.5	
Type of course		Weekly workload (lectures + practical classes):		Year of study::	
Compulsory		1 + 2 and 2 + 2 hours		III	
				V и VI	
2. FORMS OF TEACHING AND LEARNING					
Contact hours:	Hours	Credits:	Independent (self-directed) study hours:	Hours	Credits:
Lectures	45	1,5	Consultations (tutorials with academic staff)	25	0.8
Practical classes	60	2	Self-directed study	50	1.7
3. ASSESSMENT AND QUALITY CONTROL					
Forms of assessment and their weighting in the final grade				Weighting within continuous assessment	
Final (sessional) assessment:- Theoretical examination (written and oral) and Practical examination				0.4	
Continuous (semester-based) assessment:				0.6	
Forms of continuous assessment:					
- Colloquium (written component and oral examination)				0.7	
- Seminar and practical classes – practical assessment and test-based evaluation				0.3	

ANNOTATION

of the Course "General Pathology"***

Purpose of the Course

The course **General Pathology** is intended for third-year students enrolled in the Master's degree programme in **Medicine**.

Aims

The course **General Pathology** provides opportunities for the acquisition of knowledge and skills related to intracellular accumulations of lipids, proteins and pigments; adaptive processes; accumulation of fibrinoid, hyaline, amyloid, calcium salts and sodium urates in the extracellular matrix; necrosis; disorders of blood circulation; inflammation; pathology of the immune system; and tumours.

Structure of the Course Content

The lecture course includes:

- ✓ intracellular accumulations of lipids, proteins and pigments;
- ✓ adaptive and compensatory processes;
- ✓ accumulation of fibrinoid, hyaline, amyloid, calcium salts and sodium urates in the extracellular matrix;клетъчна
- ✓ cell death – necrosis and apoptosis;
- ✓ disorders of blood circulation;
- ✓ inflammation and pathology of the immune system;
- ✓ tumours.

Practical Skills and Knowledge Acquired in the Course

- ✓ Acquisition of in-depth morphological knowledge of the main pathological processes across all sections of general pathology.
- ✓ Detailed understanding of the theoretical foundations of the origin, growth and development of tumours..
- ✓ Mastery of the terminology related to precancerous conditions, benign and malignant tumours..
- ✓ Acquisition of principles for biopsy sampling, completion of the relevant documentation, and development of skills for objective communication of clinical findings to the pathologist.
- ✓ Development of a high level of medical culture

Teaching Aids:

Light microscopy specimens, multimedia presentations, discussions, and solving practical, clinically oriented tasks.

Assessment of Acquired Knowledge

The assessment of students' knowledge is based on a combination of modern and classical methods..

Continuous assessment::

- ✓ Oral examination during practical classes
- ✓ Seminar sessions – practical assessment and test component
- ✓ Colloquium with a written component and oral examination

End-of-semester examination:

- ✓ Practical examination
- ✓ Theoretical examination consisting of a written component, archived at the department, and an oral component

Expected Learning Outcomes

Upon completion of the course, students are expected to acquire the following knowledge and skills:

- ✓ Understanding of the main pathological processes and structural changes in individual nosological entities.
- ✓ Acquisition of in-depth morphological knowledge across all sections of general pathology, enabling sustained mastery of clinical disciplines and the development of high medical culture.

CONTENT OF THE CURRICULUM:

THEMATIC PLAN OF LECTURES – WINTER AND SUMMER SEMESTERS

- | | |
|---|---------|
| 1. History, subject and objectives of pathology. Macroscopic methods in pathology. | 1 hour |
| 2. Methods of pathology: microscopic, histochemical and immunohistochemical methods. | 2 hours |
| 3. Cell pathology. Pathomorphological types of changes in the injured cell. | 2 hours |
| 4. Fatty and carbohydrate degeneration. | 2 hours |
| 5. Exogenous and endogenous pigments. Types of jaundice. | 2 hours |
| 6. Pathology of connective tissue. Muroid and fibrinoid degeneration. | 2 hours |
| 7. Hyaline and amyloid degeneration. | 2 hours |
| 8. Necrosis. | 2 hours |
| 9. Disorders of blood circulation: left-sided and right-sided, acute and chronic heart failure. | 2 hours |
| 10. Disorders of blood circulation: arterial and venous hyperaemia. Bleeding and haemorrhage. Plasma leakage. | 2 hours |
| 11. Disorders of blood circulation: rheological disorders. Thrombosis. Disseminated intravascular coagulation (DIC syndrome). | 2 hours |
| 12. Disorders of blood circulation: embolism. Shock. Disorders of lymphatic circulation. | 3 hours |
| 13. Inflammation: definition, aetiology, phases. Pathogenesis and morphogenesis of inflammation. Exudative inflammation. | 2 hours |
| 14. Inflammation: morphological characteristics of diffuse interstitial and granulomatous productive inflammation. Immunopathology. | 2 hours |
| 15. Compensatory and adaptive processes: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia. | 2 hours |
| 16. Regeneration: complete and incomplete regeneration. Regeneration of different tissues and organs. | 2 hours |
| 17. Tumours: definition and nature of tumour growth; morphological and other characteristics of tumours. Aetiology of tumours. | 2 hours |
| 18. Tumours: biological behaviour of tumours – benign and malignant tumours. | 2 hours |

19.	Tumours: immunohistochemical markers for differential diagnosis of certain tumours. Other diagnostic methods for tumours.	2 hours
20.	Tumours: terminology and classification of tumours. Tumours of epithelia origin.	2 hours
21.	Tumours: tumours of mesenchymal origin.	2 hours
22.	Tumours: tumours of the nervous system. Teratomas. Pigmented tumours.	2 hours
23.	Disorders of foetal development. Congenital malformations. Fetopathies.	
TOTAL:		45 hours

THEMATIC PLAN OF SEMINAR SESSIONS AND PRACTICAL CLASSES – WINTER SEMESTER

1.	Review of normal histology: brain, lung, myocardium, stomach, liver, kidney, spleen, lymph node, skin.	2 hours
2.	Acute reversible cellular injury: cellular swelling, excessive accumulation of carbohydrates and lipids.	2 hours
3.	Excessive accumulation of lipids. Accumulation of exogenous pigments.	2 hours
4.	Intracellular accumulations. Accumulation of endogenous pigments.	2 hours
5.	Damage to the extracellular matrix. Fibrinoid and hyaline changes.	2 hours
6.	Damage to the extracellular matrix. Accumulation of amyloid, calcium salts and sodium urates.	2 hours
7.	Cell death: apoptosis and necrosis.	2 hours
8.	Compensatory and adaptive processes: atrophy, hypertrophy, hyperplasia, metaplasia, dysplasia.	2 hours
9.	Seminar 1 – Degenerative processes, cell death, compensatory and adaptive processes.	2 hours
10.	Colloquium 1 – Degenerative processes, cell death, compensatory and adaptive processes.	2 hours
11.	Disorders of blood circulation: hyperaemia, ischaemia, oedema, haemorrhages.	2 hours
12.	Disorders of blood circulation: thrombosis, DIC syndrome, infarction.	2 hours
13.	Disorders of blood circulation: embolism, shock.	2 hours
14.	Seminar 2 – Disorders of blood circulation.	
15.	Colloquium 2 – Disorders of blood circulation.	2 hours
TOTAL:		30 hours

**THEMATIC PLAN OF SEMINAR SESSIONS AND PRACTICAL CLASSES –
SUMMER SEMESTER**

1. Inflammation: main morphological changes. Classification.	2 hours
2. Exudative inflammation.	2 hours
3. Proliferative inflammation.	2 hours
4. Granulomatous inflammation.	2 hours
5. Regeneration and pathology of the immune system.	2 hours
6. Seminar 1 – Inflammation and pathology of the immune system.	2 hours
7. Colloquium 1 – Inflammation and pathology of the immune system.	2 hours
8. Benign epithelial tumours.	2 hours
9. Malignant epithelial tumours – Part I. Immunohistochemical diagnosis of tumours.	2 hours
10. Malignant epithelial tumours – Part II.	2 hours
11. Benign mesenchymal tumours.	2 hours
12. Tumours of the nervous system.	2 hours
13. Pigmented tumours. Teratomas.	2 hours
14. Seminar 2 – Tumours.	
15. Colloquium 2 – Tumours.	2 hours
TOTAL:	30 hours

COURSE SYLLABUS
“GENERAL PATHOLOGY”
Degree Programme: Medicine
Educational Qualification Degree: Master

1. Subject, objectives and methods of pathology.
2. Death: clinical and biological. Signs of biological death.
3. Cellular injury: definition, categories of cellular injury, causative factors, pathogenetic and morphogenetic mechanisms.
4. Cellular injury: types of degeneration according to substrate, localisation and distribution. Acute reversible cellular injury (cellular swelling). Hydropic degeneration.
5. Excessive accumulation of substances within the cell: mechanisms. Excessive accumulation of proteins (hyaline droplet degeneration, Mallory bodies and Russell bodies) and carbohydrates. Methods of detection.
6. Disorders of lipid metabolism. Parenchymal and mesenchymal fatty degeneration. Accumulation of cholesterol and cholesterol esters. Methods of detection. General obesity. Lipomatosis. Cachexia.
7. Lysosomal storage diseases (thesaurismoses) – general characteristics.
8. Disorders of pigment metabolism. Classification. Accumulation of exogenous pigments.
9. Accumulation of iron-containing haemoglobinogenic pigments.
10. Accumulation of haemoglobinogenic pigments that do not contain iron. Jaundice.
11. Disorders of metabolism and accumulation of proteinogenic substances.
12. Excessive accumulation of substances in the extracellular matrix of connective tissue. Connective tissue degeneration – mucoid swelling. Fibrinoid degeneration.
13. Disorders of collagen and elastin synthesis.
14. Fibrosis: types, causes, mechanisms of development.
15. Hyalinosis: causes and types.
16. Amyloidoses: general physico-chemical characteristics, classification, main types according to composition, methods of detection.
17. Types of amyloidosis according to aetiology and extent of the process. Organ manifestations. Diagnosis.
18. Disorders of calcium and copper metabolism. Abnormal accumulation of uric acid salts.

19. Cell death. Necrobiosis. Necrosis: definition, types, nuclear and cytoplasmic morphological changes.
20. Clinico-anatomical forms of necrosis. Evolution and outcomes.
21. Apoptosis: definition, differences between apoptosis and necrosis. Role of apoptosis in pathology.
22. Disorders of blood circulation: general overview, local and systemic circulatory disorders. Changes in blood volume. Arterial hyperaemia.
23. Venous congestion. Acute and chronic left-sided heart failure – morphological changes.
24. Venous congestion. Acute and chronic right-sided heart failure – morphological changes.
25. Bleeding and haemorrhages. Plasma leakage. Terminology, mechanisms and outcomes.
26. Thrombosis: definition and morphogenesis. Structure of thrombi. Difference between a thrombus and a post-mortem clot.
27. Thrombosis: types of thrombi, complications and evolution.
28. Disseminated intravascular coagulation (DIC syndrome): morphological changes and pathogenetic mechanisms.
29. Types of embolism according to substrate. Comparison between embolism and metastasis.
30. Infarction: definition and types. Morphological characteristics of anaemic infarction.
31. Infarction: definition and types. Morphogenesis of haemorrhagic infarctions. Haemorrhagic infarction.
32. Shock: definition, pathogenetic types, morphological changes.
33. Disorders of lymphatic circulation: terminology and complications. Changes in tissue fluid volume. Oedema: definition and pathogenetic types. Pulmonary and cerebral oedema. Dehydration.
34. Inflammation: definition, terminology, main features. Aetiological factors from the external and internal environment.
35. Morphogenesis of acute (exudative) inflammation. Haemodynamic and permeability changes in the microcirculation. Leukocyte emigration and phagocytosis.
36. Cellular types in the focus of acute and chronic inflammation.
37. Exudative inflammation: types, morphology, complications and outcomes.
38. Productive inflammation: forms and morphological characteristics of diffuse productive inflammation.

39. Non-specific and "specific" granulomatous productive inflammation. Morphological changes.
40. Pathology of immunity. Hypersensitivity reactions of anaphylactoid and cytotoxic type (Type I and Type II).
41. Pathology of immunity. Hypersensitivity reactions of immune complex and delayed type (Type III and Type IV).
42. Pathology of immunity: types. Autoimmune diseases. Syndromes of congenital and acquired immunodeficiency.
43. Transplant immunology. Graft rejection reaction.
44. Compensatory processes: hypertrophy and hyperplasia. Morphological characteristics.
45. Atrophy and histological accommodation: definition, types, morphological characteristics.
46. Metaplasia: definition, types, morphological characteristics, complications.
47. Regeneration: restitution and substitution. Factors influencing reparative processes. Wound healing.
48. Regeneration of different tissues and organs.
49. Tumours: definition, incidence and distribution. Biology of tumour growth.
50. Tumours: terminology, classification, structure of tumours.
51. Aetiology of tumours. Chemical, physical, viral and genetic carcinogenesis. Role of growth factors.
52. Morphogenesis of tumours. Monocentric and multicentric theories of tumour origin. Biological basis of invasion of malignant tumours. Metastasis.
53. Morphological characteristics of tumours. Differences between benign and malignant tumours. Tissue and cellular atypia.
54. Precancerous conditions. Dysplasia. Carcinoma in situ.
55. Metastasis of tumours.
56. Degree of differentiation and staging in tumour development. TNM system.
57. Structure and shape of tumours – macroscopic and microscopic characteristics. Role of immunohistochemical markers in tumour diagnosis.
58. Molecular basis of tumour growth.
59. Benign tumours of epithelial origin.
60. Malignant tumours of epithelial origin.
61. Benign tumours of mesenchymal origin.
62. Malignant tumours of mesenchymal origin.

63. Tumours of the central nervous system – general characteristics, classification, main representatives.
64. Tumours of the cells of the nerve sheaths. Tumours of the meninges.
65. Tumours and tumour-like lesions of pigmented tissue. Teratogenic tumours.
66. Genopathies and fetopathies: types and morphological characteristics.
67. Embryopathies: types and morphological characteristics.
68. Fetopathies: types and morphological characteristics.

LITERATURE

1. *Textbook of General Pathology, Vol. 1, edited by Prof. Grigor Velez, Znanie Publishing House Ltd., 1999.*
2. *Fundamentals of Pathology, edited by Prof. Iv. Valkov, Sofia, Ciela Publishing House, 1998.*
3. *Mohan, H. Textbook of Pathology, 6th Edition, 2010.*
4. *Rubin's Pathology, 6th Edition, 2012, free eBook (download).*
5. *Robbins Basic Pathology, 9th Edition, 2013, free eBook (download).*

Programme compiled by:

/Assoc. Prof. Nedyalka Zhgurova, MD, PhD/

.....

/Chief Assistant Prof. Ruska Nenkova, MD, PhD/

The curriculum for the course “**General Pathology**” for the degree programme **Medicine** was approved at a meeting of the Department of **Anatomy, Histology and Embryology, Pathology, Forensic Medicine and Deontology**, Minutes No. 36... dated... 06.01.2026

Head of Department:

(Prof. Ivaylo Stefanov, DVM, PhD)

The curriculum was approved and discussed at a meeting of the **Faculty Council of the Faculty of Medicine**, Minutes No. 38.. dated .. 09.01.2026 .

Scientific Secretary of the Faculty Council:

(Chief Assistant Prof. Ruska Nenkova, MD, PhD)

BURGAS STATE UNIVERSITY "PROF. DR. ASEN ZLATAROV"

FACULTY OF MEDICINE

**DEPARTMENT "PHYSIOLOGY, PATHOPHYSIOLOGY, MEDICAL
GENETICS, PARASITOLOGY, CLINICAL LABORATORY AND
IMMUNOLOGY"**

APPROVED I DEAN:

/ Prof. , PhD, Rumiana Yankova /

CURRICULUM

Course title: **PATHOPHYSIOLOGY**

Specialty: **MEDICINE**

Professional field: **7.1. MEDICINE**

Medicine Educational and qualification degree: **MASTER'S**

Mode of study: **FULL-TIME**

Burgas, 2025

EXCERPTS FROM THE CURRICULUM

1. GENERAL PARAMETERS OF THE DISCIPLINE			
Total study workload (hours):	150	Credits:	5
Contact hours	Non-contact hours	Contact credits	Non-contact credits
105	45	3.5	1.5
Type of discipline:	Number of hours per week: /lectures + exercises/	Year of study:	Semester:
Mandatory	1+2 and 2+2	III	V and VI

2. TEACHING FORMS					
Contact workload:	Hours	Credits	Non-contact workload:	Hours	Credits
Lectures	45	1.5	Consultations (work with instructor)	5	0.1
Practical classes	60	2	Independent work:		
			- Preparation for colloquia.	10	0.4
			- Preparation for exam.	20	0.6
			- Preparation and presentation of term papers, presentations	10	0.4

3. ASSESSMENT AND CONTROL	
Forms of assessment and control	Relative weight in final grade
Session assessment: Exam	0.4
Semester (ongoing) assessment:	0.6
Forms of semester control:	
- Attendance at classes	0.1
- Ongoing questioning before each exercise	0.04
- Active participation in classes	0.02
- Tests and quizzes	0.1
- Preparation and presentation of term papers, presentations	0.04
- Seminar classes	0.05
- Colloquia	0.05

ANNOTATION

of the discipline “Pathophysiology”

Purpose of the academic discipline:

The academic discipline “Pathophysiology” is intended for students in the specialty “Medicine”, full-time form of education.

Goals:

The goal of the “Pathophysiology” course is to provide knowledge and acquisition of basic competencies in students regarding the causes, onset, development and outcome of diseases. The subject of pathophysiology is the causes and mechanisms of impaired functions at the level of cell, organ, system and the organism as a whole in disease or injury.

Pathophysiology is a unifying link between preclinical (physiology, biochemistry and pathology) and clinical disciplines. Pathophysiology has fundamental importance for the education of medical students. It aims to reveal the common mechanisms that disrupt the functions of individual systems in the main pathological processes and diseases and to indicate why and how lesions in structure and function lead to the symptoms and signs of disease. Pathophysiology strives to develop in students functional thinking, medical logic and the ability to integrate knowledge from basic disciplines to solve the problems of the diseased organism in the clinic. Pathophysiology provides an opportunity, with its in-depth knowledge of the causes and mechanisms of diseases, for medical students to make rational decisions regarding disease therapy.

Main tasks of the curriculum:

Mastery of basic concepts in order to form in students scientific, applied-scientific and practical knowledge and skills.

- Study of the disease, its essence, stages of course and outcome
- Study of general etiology and general pathogenesis and the significance of individual organism characteristics and reactivity
- Study of the main types of pathological processes – inflammation: fever, hypoxia, metabolic disturbances
- Study of the general patterns of disorders of individual systems – blood, cardiovascular, respiratory, renal, digestive, endocrine and nervous.

Structure of the curriculum content:

- General pathophysiology
- Special pathophysiology

Teaching methods: conventional and innovative teaching methods, lectures, discussions, experimental work, computer modeling, multimedia presentations, projects, case studies, teamwork, etc. A key aspect will be interactive learning, facilitating joint interpersonal cognitive communication and interaction between instructor and student in the learning process through exchange of knowledge and ideas, case solving, debates. Encouragement of individual opportunities for reflection, visualization and selection of an appropriate model for

graphically presenting logical connections of knowledge – experiment, image capture, note-taking.

Forms of independent work: term papers of reference type, tasks for independent solving on topics from practical classes, written colloquia on sections of the curriculum, solving tests, preparation and presentation of term papers, presentations.

Assessment methods: ongoing control during classes, including oral questioning before conducting practical classes, tests, seminar classes and discussions, colloquia with a test part and oral questioning on the main sections of the discipline; final control, including a practical and theoretical semester exam with a written section archived in the department and an oral section before a committee of habilitated lecturers.

Prerequisites regarding students' basic knowledge and skills:

Students should have good foundational knowledge of physiology and already acquired skills in working with laboratory glassware and equipment.

Expected outcomes:

Upon successful completion of the course, students should master the following knowledge and skills:

- In-depth theoretical knowledge of the fundamental mechanisms of pathological processes and diseases.
- Development of functional thinking, medical logic, and the ability to interpret knowledge from core disciplines to solve patient care problems in practice.

CONTENTS OF THE CURRICULUM LECTURES

Fifth Semester	
Topic	Hours

1. Subject, objectives, methods, and historical development of pathological physiology. Essence of the pathological experiment. Modeling of diseases – principles, types. General experimental methodology. Significance of pathophysiology for diagnosis and therapy, as well as for the duration and quality of human life. General significance of diseases. Main views on the essence of disease. Pathological reaction, pathological process, pathological state. General principles for disease classification. Terminal states, clinical and biological death.	1
2. General significance of the etiology and pathogenesis of diseases. Causes of disease onset. Pathogenetic mechanisms. Relationship between etiology and pathogenesis. Role of the etiologic factor in pathogenesis. Cause-and-effect relationships in the development of the disease process. Main link and leading pathogenetic factors. Functional/structural, local/general, specific/nonspecific relationships in pathogenesis.	1
3. General etiology and pathogenesis of microcirculation disorders. Arterial and venous hyperemia, ischemia, infarction, stasis, thrombosis, embolism.	1
4. Etiology and pathogenesis of inflammation. Essence, causes, and cardinal local and general clinical signs. Primary processes: alteration with impaired metabolism, vascular changes, pathogenetic essence, cellular response, proliferation. Mediators of inflammation. Classification and outcome. Biological significance. Chronic inflammation. Mechanisms of reparative processes in inflammation and trauma.	1
5. Etiology and pathogenesis of fever. Mechanism of onset and course of fever, stages. Metabolism during fever. Changes in the functional state of body systems. Biological significance.	1

6. Pathogenic action of environmental factors. Physical factors – mechanical /traumatic shock/, accelerations /kinetoses, weightlessness/, high and low temperatures, electric current, radiant energy, high and low atmospheric pressure. Acoustic factors, vibrations. Chemical factors. Biological factors – infectious process. Psychic factors. Relationships between psychogenic profile and mental status.	1
7. Reactivity and resistance of the organism – definition, types. Main mechanisms of reactivity and resistance. Allergy – pathophysiological essence, types of allergic processes.	1
8. Pathogenetic essence of self-tolerance. Autoimmune diseases – pathogenetic variants. Hereditary and acquired immunodeficiency states. AIDS – etiology and pathogenesis.	1
9. Hypoxia. Definition and essence of hypoxia, functional-laboratory indicators, classification. Types of hypoxia systems. Pathogenetic essence of hypoxic, chemical and circulatory hypoxia. Disorders in oxygen utilization. Tissue hypoxia – stages. Adaptations in hypoxic states.	1
10. Pathophysiology of the respiratory system. General mechanisms disrupting pulmonary functions – restrictive disorders, airway obstructions, pulmonary blood flow deficit, disturbances in breathing control. Mechanisms impairing pulmonary gas exchange – changes in ventilation/perfusion ratio, impaired diffusion, alveolar hypoventilation. Forms of pathological altered breathing – dyspnea – etiology and pathogenesis.	1
11. Disorders of lipid metabolism: digestion and absorption, transport, hyperlipidemias. Dyslipoproteinemias and atherogenesis. Metabolic syndrome. Fat infiltration and fatty dystrophy. Energy imbalance – obesity – types and pathogenesis. Starvation – stages, total and partial fasting.	1

12. Disorders of carbohydrate metabolism: digestion and absorption, transport and excretion, hyperglycemias, hypoglycemias, hereditary disorders. Disorders of protein metabolism: digestion and absorption of proteins and amino acids, protein composition of blood, end products of protein metabolism, hereditary disorders. Disorders of purine nucleotide metabolism. Gout.	1
13. Disorders of water-electrolyte balance – dehydration – types, pathogenesis. Edema – pathogenesis. Disorder of mineral metabolism – sodium (hypo- and hypernatremia), potassium (hypo- and hyperkalemia), chloride (hypo- and hyperchloremia), calcium (hypo- and hypercalcemia), phosphorus (hypo- and hyperphosphatemia), magnesium (hypo- and hypermagnesemia).	1
14. Disorders of acid–base balance (ABB). Compensatory mechanisms. Acidoses, alkaloses – types, pathogenesis. Effect of altered ABB on organs and systems. Correction of disturbed ABB.	1
15. Pathophysiology of tissue growth. Neoplasms. Definition, main types. General etiology and pathogenesis of neoplasms. Essence and stages of carcinogenesis. Growth and development of neoplasms – invasion and metastasis, mechanisms and features. Tumor–organism relationships.	1
Sixth Semester	
1. Pathophysiology of disturbed vitamin metabolism. Water- and fat-soluble vitamins. Hypo- and hypervitaminoses.	2
2. Pathophysiology of the cardiovascular system. Etiology, pathogenesis and hemodynamics in endocardial disorders. Rheumatism. Injuries of myocardium and pericardium. Heart failure – definition, mechanisms and types.	2
3. Pathophysiology of the cardiovascular system. Coronary circulation disorders – etiology, pathogenesis, forms, consequences.	2

4. Pathophysiology of the cardiovascular system. Etiology and pathogenesis of essential (primary) hypertension and symptomatic (secondary) hypertensions. Acute circulatory failure – syncope, shock, etiology, pathogenesis.	2
5. Pathophysiology of the cardiovascular system. Rhythm and conduction disorders.	2
6. Pathophysiology of the excretory system. Etiology and pathogenesis of the main renal diseases. Functional disorders in glomerular and tubulo-interstitial injuries. Etiology and pathogenesis of acute and chronic renal failure.	2
7. Pathophysiology of the blood system. Disorders of erythrocytes, leukocytes and thrombocytes.	2
8. Pathophysiology of the digestive system. Disorders of gastric secretory activity. Diarrhea and constipation – mechanisms. Malabsorption and maldigestive syndrome.	2
9. Etiology and pathogenesis of the main diseases of the digestive system – gastritis, peptic ulcer disease and pancreatitis.	2
10. Pathophysiology of the liver. Etiology and pathogenesis of hepatitis and cirrhosis. Hepatic dysfunctions – pathogenesis. Hepatic failure.	2
11. Pathophysiology of the endocrine system. Main mechanisms of endocrine disorders. Hypothalamic–pituitary disorders – pathogenesis.	2
12. Pathophysiology of the endocrine system. Disorders of adrenal and thyroid gland functions.	2
13. Pathophysiology of the endocrine system. Diabetes mellitus – etiology and pathogenesis. Metabolic syndrome.	2

14. Pathophysiology of the nervous system. General etiology and pathogenesis. Pathophysiology of pain. Cognitive function disorders in the nervous system.	2
15. Pathophysiology of the nervous system. Motor function disorders in the nervous system. Cerebral circulation disorders.	2
Total:	45 h.

EXERCISES

Fifth Semester	
Topic	
1. Microcirculation disorders – arterial and venous hyperemia.	2
2. Microcirculation disorders – ischemia, infarction, thrombosis, embolism.	2
3. Pathophysiology of inflammation.	2
4. Immune response disorders. Allergy. Autoimmune and immunodeficiency states.	2
5. Disorders of thermoregulation. Fever.	2
6. ONGOING ASSESSMENT – Disease. General etiology. General pathogenesis. Disorders of microcirculation. Pathophysiology of inflammation. Disorders of immune response. Fever.	2
7. Disorders of metabolism – protein and carbohydrate metabolism.	2
8. Disorders of metabolism – lipid metabolism. Hyperlipidemias.	2
9. Disorders of water balance. Edema.	2
10. Disorders of electrolyte balance and microelements.	2

11. Colloquium: Disorders of carbohydrate, lipid and protein metabolism. Disorders of water–electrolyte balance.	2
12. Disorders of acid–base balance.	2
13. Hypoxia. Types of hypoxia. Metabolic changes in hypoxia.	2
14. Pathogenic action of environmental factors.	2
15. Disorders of tissue growth. Pathophysiology of tumors.	2
Sixth Semester	
1. Pathophysiology of the respiratory system – obstructive and restrictive disorders.	2
2. Pathophysiology of the cardiovascular system. Diseases of endocardium and myocardium.	2
3. Pathophysiology of the cardiovascular system. Ischemic heart disease. Heart failure.	2
4. ONGOING ASSESSMENT – Pathophysiology of the respiratory system. Pathophysiology of tissue growth. Hypoxia.	2
5. Pathophysiology of the vascular system – hypertension.	2
6. Pathophysiology of the vascular system – hypotension.	2
7. Pathophysiology of the blood system.	2
8. Pathophysiology of the excretory system.	2
9. Pathophysiology of the digestive system. Gastritis. Peptic ulcer disease.	2
10. Pathophysiology of the digestive system. Pancreatitis. Malabsorption and maldigestion.	2
11. ONGOING ASSESSMENT – Pathophysiology of the cardiovascular system. Pathophysiology of the excretory system.	2
12. Pathophysiology of the endocrine system. Diabetes mellitus.	2
13. Pathophysiology of the endocrine system. Metabolic syndrome.	2

14. Pathophysiology of the liver. Jaundice. Hepatitis. Liver failure. Cirrhosis.	2
15. Pathophysiology of the nervous system. Sensory disorders. Motor disorders. Pain.	2
Total:	60 h.

Conspectus for the mandatory discipline “Pathophysiology” included in the curriculum for the specialty “MEDICINE” for third-year students.

1. Health and disease – definition and essence. Concepts. Pathological reaction, pathological process, pathological state. Modern view of disease.
2. Periods of disease. Terminal states and basic principles of management.
3. General etiology – essence and concepts. Contemporary views on etiology.
4. General pathogenesis. Role of the etiologic factor in pathogenesis.
5. Main pathogenetic mechanisms of disease onset and development.
6. Pathophysiology of cellular–tissue injury. Cellular dystrophy and necrosis. Apoptosis. Role of free radicals in disease pathogenesis.
7. Pathogenic action of mechanical factors. Traumatic shock – pathogenesis.
8. Pathogenic action of high and low temperatures on the organism.
9. Pathogenic action of electric current and ionizing radiation on the organism.
10. Pathogenic action on humans of altered atmospheric pressure, accelerations, acoustic waves, and factors in space flight.
11. Pathogenic action of chemical and biological factors on the organism.
12. Reactivity and resistance of the organism – essence, types, and their significance for pathology. Factors and mechanisms of pathological reactivity and resistance.
13. Disorders of the immune response.
14. Allergy – definition, essence, etiology, and classification.
15. Humoral-type allergy.

16. Cell-mediated allergy.
17. Mechanisms of autoimmune diseases.
18. Immunodeficiency and immunosuppressive diseases.
19. Disorders of protein digestion and absorption in the gastrointestinal tract. Disorders of intermediate protein metabolism. Changes in serum proteins.
20. Disorders of late stages of protein metabolism. Hyperazotemia and hyperammonemia.
21. Purine nucleotide metabolism disorder. Gout.
22. Impaired digestion and absorption of carbohydrates.
23. Hyperglycemias and hypoglycemias – mechanisms, types.
24. Impaired digestion and absorption of lipids in the gastrointestinal tract. Hyperlipidemias – mechanisms and types.
25. Disorders of lipid metabolism in adipose tissue – increased ketogenesis. Fatty dystrophy of the liver.
26. Obesity – types, pathogenesis.
27. Disorders of lipoprotein metabolism. Atherosclerosis – contemporary views on pathogenesis.
28. Water–salt balance disorders – positive and negative water–salt balance.
29. General pathogenesis of edema.
30. Disorders of sodium, chloride, and potassium metabolism.
31. Disorders of calcium–phosphate metabolism.
32. Disorders of trace element metabolism.
33. Disorders of vitamin metabolism.
34. Acid–base balance (ABB) disorders. Classification.
35. Metabolic acidosis and alkalosis – mechanisms, compensations, indicators.
36. Respiratory acidosis and alkalosis – mechanisms, compensations, indicators.
37. Fasting – types, phases, and consequences.
38. Arterial hyperemia – etiology and pathogenesis, types, significance.

39. Venous hyperemia – etiology and pathogenesis, consequences. Stasis – types.
40. Ischemia – etiology, pathogenesis, consequences.
41. Infarction – types and pathogenesis.
42. Thrombosis – etiology, pathogenesis, consequences.
43. Embolism – types, mechanisms of development.
44. Hypoxia – definition, essence, types and indicators.
45. Adaptations in hypoxic conditions.
46. Characteristics of the main types of hypoxia depending on pathogenesis – hypoxic, chemical, circulatory, hypoutilization, and mixed.
47. Metabolic changes in hypoxia. Functional impairments in the organism.
48. Inflammation – etiology, signs, and biological significance.
49. Pathogenesis of acute inflammation – alteration, mediators, vascular changes in inflammation.
50. Cellular response in inflammation. Proliferative processes.
51. Fever – etiology and pathogenesis. Mechanism of action of pyrogens.
52. Stages of fever. Types of temperature curves.
53. Metabolism during fever. Changes in the functional state of body systems.
54. Neoplasms – general characteristics and types. Etiology.
55. Essence and stages of carcinogenesis.
56. Characteristics of tumor growth. Tumor–organism relationships.
57. Changes in blood volume and plasma-to-erythrocyte ratio. Blood loss and transfusion. Reactions and complications.
58. Anemia – general characteristics, pathogenetic classification.
59. Posthemorrhagic anemias – pathogenesis.
60. Anemias from defective hematopoiesis and impaired maturation of erythroid precursors.
61. Hemolytic anemias – etiology and pathogenetic mechanisms.

62. Polycythemia (erythrocytosis) – etiology and pathogenesis.
63. Leukocytosis and leukopenia – main pathogenetic mechanisms, types.
64. Leukemias – classification, etiology and pathogenesis. Leukemoid reactions.
65. Hemorrhagic diatheses – main mechanisms.
66. Coagulopathies – forms and pathogenesis.
67. Quantitative and qualitative changes in platelets.
68. Vasopathies – etiology and pathogenesis.
69. Thromboembolic diathesis.
70. Heart failure – types and compensatory mechanisms.
71. Disorders of cardiac rhythm and conduction – electrophysiological mechanisms.
72. Etiology, pathogenesis and hemodynamics in valvular lesions.
73. Etiology and pathogenesis of myocardial diseases.
74. Etiology and pathogenesis of coronary circulation disorders.
75. Angina pectoris – types, pathogenesis.
76. Myocardial infarction – pathogenesis, complications.
77. Etiology and pathogenesis of pericardial diseases.
78. Etiology and pathogenesis of essential (primary) hypertension.
79. Symptomatic (secondary) hypertension.
80. Acute circulatory failure (shock). Chronic hypotensions.
81. Types of shock – features in pathogenesis.
82. General mechanisms disrupting pulmonary functions. Obstructive, restrictive and mixed breathing disorders.
83. Mechanisms responsible for impaired gas exchange. Changes in ventilation/perfusion, impaired diffusion across the alveolo-capillary membrane. Alveolar hypoventilation syndrome.
84. Respiratory failure – definition, essence, forms and pathogenesis. Acute respiratory failure. Pulmonary edema.

85. Functional manifestations of pulmonary dysfunction.
86. Disorders of digestion in the oral cavity and esophagus.
87. Secretory and motility disturbances of the stomach and intestines.
88. Etiology and pathogenesis of gastritis and peptic ulcer disease.
89. Etiology and pathogenesis of pancreatitis.
90. Intestinal obstruction – causes, types, consequences. Gastrointestinal autointoxication.
91. General etiology and pathogenesis of liver diseases.
92. Etiology and pathogenesis of hepatitis and liver cirrhosis.
93. Pathogenesis of portal hypertension and ascites.
94. Functional hepatic failure. Hepatic encephalopathy – contemporary concepts in pathogenesis.
95. Jaundices – types and pathogenetic mechanisms.
96. Etiology and pathogenesis of glomerular lesions. Functional manifestations.
97. Etiology and pathogenesis of tubulo-interstitial disorders. Functional manifestations.
98. Disorders of diuresis. Urinary syndrome.
99. Impairments of the diluting and concentrating ability of the kidneys.
100. Pathogenesis of renal hypertension, edema and anemia.
101. Etiology and pathogenesis of acute renal failure.
102. Etiology and pathogenesis of chronic renal failure.
103. Main mechanisms in the emergence of endocrine diseases.
104. Role of the endocrine system in the pathogenesis of somatic diseases.
105. Disorders of hypothalamic and pituitary function.
106. Disorders of thyroid gland function.
107. Disorders of adrenal gland function.
108. Disorders of pancreatic endocrine function. Diabetes mellitus – etiology and pathogenesis.

109. General etiology and pathogenesis of nervous system diseases.
110. Sensory disturbances. Pain – contemporary views on pathogenesis.
111. Disorders of motor functions of the nervous system.
112. Cerebrovascular disease – etiology and pathogenesis.
113. Pathogenesis of Parkinson's disease, Alzheimer's disease and epilepsy.

LITERATURE FOR PREPARATION

Mandatory

1. Lecture course on pathological physiology for the corresponding academic year at the Medical Faculty – Burgas.
2. Fundamentals of Pathophysiology. Edited by D. Ilchev, A. Stoynev, Plovdiv, Medical Publishing "Raikov", 2012 ISBN 978-954-9666-56-4.
3. Pathophysiology of Disease. (Translated and edited by A. Bocheva, authors Gary D. Hammer and Stephen J. McPhee), Educational Centre, 2018, ISBN 978-619-7417-37-1.
4. Pathophysiology Manual – Practical Exercises. Edited by R. Radev and G. Bekyarova, MU–Varna, 2020, p. 141, ISBN 978-619-221-239-1.
5. Yanev, E., M. Balutsov. Illustrated Pathological Physiology, Sofia, Medical Publishing "ARSO", 2000. ISBN 954-8967-20-0.
6. Pathological Physiology. Edited by T. Tsekov. (Textbook for students of the specialties "Dentistry, Pharmacy and Medical Colleges"). Varna, Med. Publ. "Zograf", 2011. ISBN 978-954-15-0226-6.
7. Balutsov M. St., Z. A. Velkov, A. D. Karova. Manual for Practical Exercises in Pathological Physiology. (Edited by E. I. Yanev) Sofia, Medicine and Physical Culture, 1989. No. 616-091/092.
8. Pathophysiology: Concepts of Altered Health States. Edition: 7th – Author(s): Porth CM.; Lippincott Williams & Wilkins, 2005.

Recommended:

1. Pathologic Basis of Disease (Required). Edition: 7th – Author(s): Kumar; Fausto; Abbas. Saunders, 2004.

2. Pathophysiology of Disease. An Introduction to Clinical Medicine. (4th edition). S. J. McPhee, V. R. Lingappa, W. R. Ganong eds. USA, McGraw-Hill, 2007.
3. Practical Pathophysiology: Topical Guideline. Author(s): Bekyarova G., K. Hristov; MU – Varna, 2012.
4. Pathophysiology. The Official Journal of the International Society for Pathophysiology. ISSN: 0928-4680.

Program compiled by:

(Asoc. Prof. Dr. Radko Radev)

The curriculum was discussed and adopted at the meeting of the Department "Physiology, Pathophysiology, Medical Genetics, Parasitology, Clinical Laboratory and Immunology", Protocol No. 11 of 03.07.2025 g.

Head of Department:

(Prof. Petya Tzvetkova, PhD, DSci)

The curriculum was adopted and discussed at the Faculty Council of the Medical Faculty, Protocol No. 26 / 09.07.2025

Secretary of the FC:

(Chief Asst. Prof. Dr. Ruska Nenkova)

Actualization of the curriculum

Department council, protocol №..... of

Faculty council, protocol №..... of

BURGAS STATE UNIVERSITY "PROF. DR. ASEN ZLATAROV"
**КАТЕДРА "PEDIATRICS, PHARMACOLOGY, INFECTIOUS
DISEASES, EPIDEMIOLOGY AND TROPICAL DISEASES"**

APPROVED BY!

DEAN:

/prof. dr. Romyana Yankova/



SYLLABUS

Course:	PHARMACOLOGY
Specialty:	MEDICINE
Professional field:	7.1. MEDICINE
Educational and qualification degree:	MASTER
Form of education:	FULL-TIME

Burgas, 2025

ИЗВАДКИ ОТ УЧЕБНИЯ ПЛАН

1. GENERAL PARAMETERS OF DISCIPLINE					
Total (academic hours)::		240		ECTS:	
8					
Auditorium classes	Non-auditorium classes		Auditorium ECTS	Non-auditorium ECTS	
150	90		5	3	
Type of subject:	Number of hours per week: (lectures + practicals)		Course:	Semester:	
Mandatory	2+3 и 3+2		III	V и VI	
2. STUDY FORMS					
Auditorium classes:	Academic hours	ECTS	Non-auditorium classes:	Academic hours	ECTS
Lectures	75	2.5	Consultations Work with a teacher	30	0.5
Practical sessions	75	2.5	Self- study work - Coursework - Exam Preparation	30 60	0.5 2
3. ASSESSMENT AND CONTROL					
Assessment and Control Forms				Relative share in the total score	
Session Assessment: Exam				0.4	
Semester (Ongoing) Assessment:				0.6	
Forms of semester control:					
- Attendance in classes				0.2	
- Active participation in Educational/Scientific activities				0.2	
- Ongoing control (colloquium, tests)				0.6	

ANNOTATION

The academic discipline "PHARMACOLOGY" is obligatory for students of the specialty "Medicine", third year, full-time form of study.

Objectives: The discipline "Pharmacology" is mandatory in the education of medical students. In the lecture course of study, students are introduced to the main issues of general pharmacology - pharmacokinetics and pharmacodynamics of drugs, phenomena during their multiple and combined administration, special pharmacology - characteristics of drug groups affecting various diseases and processes in the human body; pharmacology of chemotherapeutics, antiseptics and disinfectants, vitamin drugs and drugs for the treatment of malignant diseases, which is an important prerequisite for the successful study of clinical disciplines in the above courses. The goal of pharmacology training is for students to obtain modern theoretical and practical knowledge of drugs necessary for their full professional training and clinical activity. During practical exercises, dosage forms are studied, prescription principles for their prescription are mastered, the main issues of general pharmacology and pharmacology of all groups of drugs are mastered.

Teaching methods

Forms of training: lectures, exercises

Teaching methods:

- lecture
- practical exercises
- discussions
- individual and group practical tasks
- analysis of ready-made statistical information
- research of scientific literature
- self-study

Methods of control and evaluation of results: exam

- Current assessment with tests and colloquiums. Assessment of self-developed questionnaire and health education project
- Final assessment through test and written exam

Tasks: Mastering the pharmacokinetic and pharmacodynamic features of preparations from different drug groups. Practical skills - prescribing different dosage forms, mastering different experimental methods for studying acute and chronic toxicity, analgesic, hypnotic, cardiotonic, anxiolytic effects, etc.

Expected results: In-depth knowledge of the nomenclature of drugs, indications for their use, dosage, therapeutic, side effects and drug interactions. Knowledge of minimum and maximum therapeutic doses, potentially lethal drug combinations, methods of prescribing drugs. Knowledge of the prescription.

CURRICULUM CONTENT

LECTURES

Topic	Hours
FIFTH SEMESTER	
Lecture No. 1. Subject and branches of pharmacology. Relationship with other sciences. Historical review. Drugs. Stages in the creation of new drugs. Transmembrane transport of drugs. General pharmacokinetics.	2ч.
Lecture No. 2. General pharmacokinetics. Phases of penetration and movement of the drug in the body: pharmaceutical, pharmacokinetic and pharmacodynamic. Transmembrane transport of drugs. Passive transport. Active transport. Endocytosis and exocytosis. Resorption of drugs. Mechanisms of excretion of drugs and their metabolites. Pharmacotherapeutic and toxicological significance.	2ч.
Lecture No. 3. General pharmacodynamics. Drug action and drug effect. Main types of drug action according to their nature, focus and therapeutic expediency - reversible, irreversible, local, general, symptomatic, etiotropic, pathogenetic, substitutive, direct, indirect, tonic, excitatory, sedative, suppressive, etc.	2ч.
Lecture No. 4. Factors modifying the action of drugs. Factors on the part of drugs. Physical properties (aggregate state, crystal structure, solubility) and physicochemical properties (lipid solubility, pK value, Michaelis constant, polarity). Types of doses (minimum, saturating D, maintenance, maximum, toxic, course; ED; LD) and dosing interval. Constancy of the ratio of impaired and NBF for drugs excreted in the urine. Therapeutic index. Factor of safe safety. Chronopharmacology.	2ч.
Lecture No. 5. Cholinergic mediation. Cholinomimetics. Cholinergic mediation Biosynthesis, storage, release and degradation of acetylcholine. Cholinergic receptors (cholinoceptors) types and localization. Cellular and molecular mechanisms of cholinergic mediation and principles of its pharmacological influence. Cholinomimetics (parasympathomimetics). Cholinomimetics with direct action: M- and N-cholinomimetics (Carbachol, Betanecol, Cevimeline) and M-cholinomimetics (Pilocarpine). Antiglaucoma eye drops (Carbachol, Pilocarpine) Cholinomimetics with indirect action (anticholinesterase agents): a.) preparations with reversible action, not penetrating the CNS - Demecarium (Tosmilen®), Distigmine, Neostigmine, Pyridostigmine; b.) drugs with reversible action, penetrating the CNS.	2ч.
Lecture No. 6. M-cholinolytics. neuromuscular blockers. M-cholinolytics (atropine-like agents). Plant drugs from the family Solanaceae (Radix Belladonnae, etc.). Acute poisoning with Atropa Belladonna and Datura Stramonium. Drugs containing alkaloids (Atropine, Scopolamine, Extractum Belladonnae, Tinctura Belladonnae) and their semi-synthetic derivatives (Homatropine, Hyoscine butylbromide Buscolysin). Synthetic M-cholinolytics: antispasmodics (Oxiphenonium, Spasmalgon), selective M-cholinolytics (Pirenzepine antiulcer agent), antiasthmatics (Ipratropium), mydriatics (Cyclodrine, Tropicamide) and agents affecting bladder dysfunction (Flavoxate, Propiverine, Solifenacin, Trospium). Neuromuscular blockers. Non-depolarizing neuromuscular blockers (Alcuronium, Pancuronium, Tubocurarine) and their competitive antagonists (Galantamine, Neostigmine, Pymadin). Depolarizing neuromuscular blockers: Suxamethonium (genetic features	2ч.

of its metabolism).

Lecture No. 7. Adrenergic medication. adrenomimetics. Adrenergic mediation Biosynthesis, storage, release, neuronal uptake and degradation of noradrenaline. Pre- and postsynaptic adrenergic receptors (adrenoceptors) types and localization. Cellular and molecular mechanisms of adrenergic mediation and principles of its pharmacological influence. Direct-acting adrenergic mimetics. Alpha-adrenomimetics: antihypotensive agents (Etilefrine Effortil, Midodrine Norepinephrine Noradrenaline), local nasal decongestants (Naphazoline, Tetryzoline, Xylometazoline), antiglaucoma eye drops (Phenylephrine). Cardioselective adrenomimetics: Dobutamine. Broncho- and uteroselective α -adrenomimetics: Fenoterol, Formoterol, Salbutamol, Salmeterol, Terbutaline. Nonselective adrenomimetics: Isoprenaline, Orciprenaline α - and β -adrenomimetics: Epinephrine. Adrenomimetics mainly with indirect action: Ephedrine, Mephentermine. 24.

Lecture No. 8. Adrenolytics. Alpha-adrenergic blockers: antihypertensive selective blockers (Prazosin, Doxazosin), urethroselective α -blockers (Tamsulosin). Cardioselective blockers: Acebutolol, Atenolol, Metoprolol, Sotalol. Cardioselective NO-releasing blockers: Nebivolol (Nebivolol). Non-selective blockers: cardiovascular drugs (Oxprenolol, Pindolol, Propranolol) and antiglaucoma eye drops (Levobunolol, Timolol). Beta- and alpha-blockers: Carvedilol, Labetalol. Adrenergic receptor antagonists: antihypertensive drugs (Clonidine, Methyldopa) and antiglaucoma eye drops (Apraclonidine). Adrenergic receptor agonists and blockers (antihypertensive drugs): Urapidil. Blockers mainly of peripheral adrenergic neurons (antihypertensive drugs): Reserpine, Guanethidine. 24.

Lecture No. 9. Autacoids (tissue hormones and mediators) and their pharmacological effects. Histamine and antihistamines. Histamine biosynthesis, tissue distribution and metabolism. Histaminergic receptors types, organ localization and effects associated with their activation. Hr-blockers of the I generation: Chlorpyramine (Allergosan), Cyproheptadine, Clemastine, Dimetin-dene, Embramine, Promethazine. H2-blockers of the II generation without sedative and atropine-like activity. Mast cell protectors (antiasthmatic agents): Cromoglycate, Ketotifen. Agonists and antagonists of serotonergic receptors Setrons (5-HT) biosynthesis, tissue distribution and metabolism. Serotonergic receptor types, organ localization and effects associated with their activation. Triptans Naratriptan, Sumatriptan. 5-HT-blockers (migraine prevention agents): Iprazo-chrome, Pizotifen. Setrons: Ondansetron, Tropisetron. Inhibitors of neuronal uptake (uptake I) of 5-HT (antidepressants): Fluoxetine, Flu-voxamine, Sertraline. Eicosanoids. Prostaglandins, thromboxanes, leukotrienes. Cyclooxygenase isoforms: COX-1, COX-2 and COX-3. Participation of eicosanoids in the pharmacodynamics and toxicodynamics of NSAIDs, GCS, platelet antiaggregants, etc. Uterokinetic and abortifacient agents: Dinoprost (PGF), Dinoprostone (PGE). Vasodilators: Alprostadil (prodrug of PGE). Gastroduodenal mucosal protectors. Leukotrienergetic blockers (antiasthmatic agents): Montelukast. Cyclooxygenase and lipoxygenase blockers: Mesalazine. PGF receptor agonists, lowering ophthalmotonus. Peptides and their pharmacological effects Endogenous opioid peptides. Endothelins. Angiotensin II. ACE inhibitors. Growth factors and cytokines (regulatory peptides of inflammatory and immune reactions). 2

Lecture No. 10. Anesthetics. General anesthetics. Inhalation anesthetics: volatile liquids (Aether anaestheticus, Isoflurane, Halothane) and gases (laughing gas). Injectable anesthetics-hypnotics with a slight analgesic effect: barbiturates 2

(Methohexital), thiobarbiturates (Thiopental) and others (Etomidate, Propofol). Injectable anesthetics-hypnotics with an analgesic effect: Keta-mine, Propanidide. Local anesthetics. Alkaloids: Cocaine. Cocaine addiction. PABA esters: Benzocaine, Procaine, Proxymetacaine, Tetracaine. Preparations for conduction anesthesia in dental practice: Alphacaine, Emala, Ubistesine, Xylodren.

Lecture No. 11. Mediation of nerve impulses in the CNS. Hypnotics. Sedatives. Mediation of nerve impulses in the CNS. Amino acids with inhibitory effects: GABA and glycine. Benzodiazepine and GABA-ergic receptors. Amino acids with excitatory effects (aspartate and glutamate). Involvement of glutamate in excitotoxicity and apoptosis (genetically programmed death). Pathobiochemistry of neurodegenerative diseases (Parkinson's disease, Huntington's chorea, Alzheimer's disease, amyotrophic lateral sclerosis) and modern therapeutic approaches. Opioid receptors. Cholinergic receptors in the CNS. Monoaminergic receptors: dopaminergic, noradrenergic (in the locus coeruleus), serotonergic and histaminergic. Pathobiochemistry of schizophrenia. Hypnotic drugs (hypnotics). Benzodiazepines (euhypnotics). Combined hypnotics: Reladorm (Cyclobarbitol & Diazepam), Tardyl, Dormiplant, Re- Dormin. Sedatives. Bromides: Calcii bromidum, Natrii bromidum. Bromism. Phytopreparations: Tinctura Valerianae (aetherea), VaYidol®. Herbal sedatives: Folia Melissa (lemon balm leaves), Herba Leonuri (devil's mouth stem), Radix et flores Paeoniae (red wild peony root and flowers), Radix Valerianae, Strobili Lupuli (hop cones). Combined preparations: Bellergamin, Eunervina.

Lecture No. 12. Antiepileptic drugs, antiparkinsonian drugs. Antiepileptic drugs. Pathobiochemistry of epilepsy. Pharmacotherapeutic approaches. Antiepileptic therapy and pregnancy. Pharmacotherapeutic approaches. Central dopaminergic agents: Amantadine (stimulator of dopamine exocytosis), Levodopa (on-off phenomenon), Madopar, Sinemet, D-receptor agonists, Selegiline (MAO-B inhibitor). Central M-cholinolytics: Biperiden, Trihexyphenidyl (Parkisan).

Lecture No. 13. Neuroleptics. Antimanic drugs. Anxiolytics. Psychopharmacological drugs classification. Phenothiazines with aliphatic, piperidine and piperazine side chains at the nitrogen. Butyrophenones. Diphenylbutylpiperides. Thioxanthenes. Other neuroleptics. Antimanic drugs. Antidepressants. Psychostimulants. nootropics, psychosomimetics. Tetracyclic antidepressants. Tricyclic antidepressants with sedative activity (tertiary amines). Tricyclic antidepressants with psychomotor activity (secondary amines). Inhibitors of neuronal uptake (uptake I) of 5-HT. MAO-A inhibitors.

Lecture No. 14. Opioid analgesics. Drug addictions. Historical review. Papaver somniferum and phenanthrene alkaloids of opium. Opioid receptors. Pathobiochemistry of pain and possibilities for its pharmacological influence. Preparations of natural origin. Semi-synthetic derivatives of morphine and codeine. Synthetic morphinomimetics. Neuroleptic analgesia. Acute morphine poisoning. Competitive antagonists of morphine. Morphine and heroin mania. Fetal withdrawal syndrome. Non-opioid (antipyretic) analgesics. non-steroidal anti-inflammatory drugs. Cyclooxygenase inhibition and other mechanisms of action. Acid derivatives: salicylic, phenylacetic (Diclofenac), indoleacetic (Indometacin), propionic (Ibuprofen, Ketoprofen) and enolic (Meloxicam, Piroxicam, Tenoxicam) acids. Acute salicylic intoxication. Butylpyrazolidinediones. Pyrazolones. Anilines. Combined preparations with: mainly analgesic effect, analgesic and antipyretic effect, analgesic and spasmolytic effect. Antirheumatic drugs. Local anti-inflammatory and anti-emetic agents.

Lecture №15. Drugs for the treatment of heart failure. Cardiac glycosides. Plant sources: *Folia Digitalis*, *Herba Convallariae majalis*, *Herba Adonis vernalis* (spring forest flower stalk). Historical review. Primary cardenolides: Purpurea glucoside A and B, Lanatoside A, B and C. Secondary cardenolides: Digitoxin, Digoxin. Digitalis preparations: Digitoxin, Digoxin, Lanatoside C. Semi-synthetic derivatives: Acetyldigoxin and Methyldigoxin. Acute and chronic poisoning with digitalis preparations. Cardiotonic adrenomimetics used in acute cardiovascular failure and cardiogenic shock: Dobutamine, Dopamine. Phosphodiesterase inodilators used in acute congestive heart failure: Inamrinone, Milrinone. Vasodilators effective in chronic congestive heart failure: Carvedilol. Drugs reducing preload and afterload of the heart: ACE inhibitors, inorganic nitrates and blockers. Drugs reducing preload of the heart: organic nitrates, thiazide diuretics and loop diuretics. BNP analogues. Endothelin antagonists. Metabolotropic cardioprotectors.

2

Total: 30ч.

SIXTH SEMESTER

Lecture № 1. Diuretics. calcium antagonists. Diuretics. Herbal drugs: c mainly diuretic effect (*Fructus Apii*, *Fructus Petroselini*, *Radix Levistici*, *Stigmata Maydis*, *Stipites Cerasorum*); c diuretic and uroantiseptic effect (*Folia Uvae ursi*, *Folia Vitis*); with diuretic and urolitholytic effect (*Radix Rubiae*, *Herba Equiseti*, *Herba Polygoni*).

3ч.

Lecture No. 2. Antiarrhythmic agents. Antianginal agents. Antiarrhythmic (antidysrhythmic) agents. Class I (membrane stabilizing agents): class 1A (Ajmaline, Quinidine, Disopyramide), class IB (Lidocaine, Mexiletine, Phenytoin) and class IC (Propafenone). Class IP. Acebutalol, Atenolol, Esmolol, Metoprolol, Propranolol. Class III (amiodarone-like agents): Amiodarone, Dronedarone, Sotalol, Dofetilide, Ibutilide. Class IV (calcium antagonists): Diltiazem, Verapamil. Conductivity accelerating agents: M-cholinolytics (Atropine) and non-selective adrenomimetics (Isoprenaline, Orciprenaline), indirect adrenomimetics (Ephedrine). Digitalis glycosides: Digitoxin, Digoxin. Potassium salts: Kali chloridum. Magnesium salts: Magnesii aspartas. Potassium and magnesium salts: Magnerot, Pamaton, Panangin. Antianginal (anti-angina) agents. Organic nitrates (donors of nitric oxide, causing tolerance): Glyceryl trinitrate, Isosorbide dinitrate, Isosorbide mononitrate. Dosage forms with fast, intermediate and prolonged effect. Beta-blockers: Acebutolol, Atenolol, Bisoprolol, Metoprolol, Pindolol, Proparnolol. Metabolotropic antianginal agents: Trimetazidine (Preductal), Ranolazine. Calcium antagonists (blockers): Amlodipine, Diltiazem, Verapamil. Platelet antiaggregants: Aspirin, Dipyridamol, etc. Principles of combining antianginal agents. Phenomenon of withdrawal.

3ч.

Lecture No. 3. Peripheral vasodilators. vasoprotectors. antimigraine agents, antidyslipidemic agents. Peripheral vasodilators. Alpha-blockers: Dihydroergocristine, Dihydroergotamine, Dihydroergotoxine. Myotropic vasodilators: phosphodiesterase inhibitors (Pentoxifylline, Xantinol Nicotinate), Acidum nicotinicum, Alprostadil, Dibazol, Extractum Ginkgo bilobae (Tanacan), Naftidrofuryl (Dusopharm), Papaverine. Cerebral vasodilators: calcium antagonists (Cinnarizine, Flunarizine, Nimodipine), Extractum Ginkgo bilobae (Tanacan), Naftidrofuryl (Dusopharm), Phezam (Cinnarizine & Piracetam), Vinpocetine. Vasoprotectors. Capillarotonic agents. Venotonic agents: Detralex®, Endotelon®, Troxevasin®. Heparin ointments: Heparoid®, Lioton®. Antihemorrhoidal agents: Detralex®, Ultraproct®. Antimigraine agents. Agents for the treatment of acute

3ч.

attacks. Agents for the prevention of migraine. Antidyslipidemic agents. Agents that suppress the biosynthesis of cholesterol and atherogenic lipoproteins: inhibitors of hydroxymethylglutaryl-CoA reductase (statins Atorvastatin, Fluvastatin, Pravastatin), fibrates (Bezafibrate, Fenofibrate, Gemfibrozil). Agents that accelerate the metabolism of cholesterol and lipids (ion exchange resins): Colestipol, Colestyramine..

Lecture No. 4. Antihypertensive agents. Non-pharmacological methods for the treatment of arterial hypertension ACE inhibitors. Sartans. Agonists of mainly central adrenergic receptors. Selective agonists of imidazoline receptors: Moxonidine. Cardioselective blockers: Acebutolol, Atenolol, Bisoprolol, Metoprolol. Cardioselective -blockers,. Non-selective -blockers: Oxprenolol, Pindolol, Propranolol. blockers: Doxazosin, Prazosin. Blockers mainly of peripheral adrenergic neurons: Reserpine, Guanethidine. Calcium antagonists (calcium channel blockers): Amlodipine, Diltiazem, Felodipine, Nifedipine (in the absence of CHD), Nisoldipine (in the absence of CHD), Nitrendipine, Verapamil. Myotropic vasodilators: Diazoxide, Dihydralazine, Nitroprusside. Diuretics: salidiuretics Chlorthalidone, Hydrochlorothiazide, Indapamide, loop diuretics (Furosemide), potassium-sparing diuretics. Combined antihypertensive drugs: Brinerdin®, Chlophadon®, Co-Renitec®, Rethizid®, Viskaldix®. Drugs effective in hypertensive crises.

34.

Lecture No. 5. Drugs affecting blood coagulation and fibrinolysis. Antihemorrhagic agents. Coagulants with local action. Coagulants with systemic action. Antifibrinolytics. Blood clotting factors. Adrenomimetics. Vasopressin analogues. Capillarotonic agents. Venotonic agents. Platelet antiaggregants. Direct-acting anticoagulants containing low molecular weight fractions of heparin - Antidote Protamini sulfas. Direct-acting anticoagulants containing heparin in the form of sodium salts and calcium salts - Antidote: Protamini sulfas. Heparin ointments. Non-reactive anticoagulants (coumarin derivatives). Acenocoumarol, Warfarin. Antidote: Phytomenadione. Direct thrombin inhibitors. Fibrinolytics. Drugs affecting hematopoiesis. infusion solutions, parenteral nutrition agents. Drugs stimulating erythropoiesis (anti-anemic agents). Iron preparations for oral administration: Ferrosi aspartas, Ferrosi chloridum, Ferrosi glutamas (Glubifer®), Ferrosi sulfas (Ferrogradumet®, Hemofer prolongarum®), Maltofer®. Iron preparations for parenteral administration: Venofer®. Vitamin preparations: Acidum folicum, Cyanocobalmain (Vitamin B). Erythropoietin preparations: Epoetin alfa, Epoetin beta (Recormon®), Darbepoetin alfa. Myeloid growth factors: Filgrastim, Pegfilgrastim, Sargramostim. Megakaryocyte growth factors: Oprelvekin, Thrombopoietin. Infusion solutions.

34.

Lecture No. 6. Antibiotics. Beta-lactam antibiotics. Classification by mechanism, type and spectrum of action. Penicillins. Historical review. Biosynthetic penicillins. Beta-lactamase-resistant penicillins. Broad-spectrum penicillins. Beta-lactamase inhibitor-protected broad-spectrum penicillins. Combination penicillins. Cephalosporins. First-generation cephalosporins. Second-generation cephalosporins. Third-generation cephalosporins. Fourth-generation cephalosporins. Cephalosporins with significant biliary excretion. Beta-lactamase inhibitor-protected cephalosporins. Carbapenems. Non-beta-lactam antibiotics. Aminoglycosides. Macrolides. Lincosamides (lincosamines): Clindamycin, Lincomycin. Polymyxins: Colistin. Glycopeptides. Sulfonamides. Antimycobacterial agents, principles of rational antimicrobial therapy and prophylaxis. Sulfonamides (competitive antagonists of

34.

PABK). Historical review. Short-acting sulfonamides. Sulfonamides with negligible intestinal absorption (enteroantiseptics). Sulfonamides and trimethoprim. Sulfonamides with antiulcer activity. Antimycobacterial agents. Antituberculosis agents. Modern antituberculosis combinations. Antileprosy agents. Principles of rational antimicrobial therapy and prophylaxis.

Lecture No. 7. Quinolones, oxyquinolines and nitrofurans. antiviral agents. Quinolones (quinolones, gyrase inhibitors). Nalidixic acid derivatives. Fluoroquinolones: Ciprofloxacin, Enoxacin, Grepofloxacin, Ofloxacin, Pefloxacin. Oxyquinolines: enteroantiseptics and uroantiseptics. Nitrofurans: enteroantiseptics and uroantiseptics. Antiviral agents. Antiinfluenza agents: Amantadine, Rimantadine, Oseltamivir, Zanamivir. Interferons. Nucleoside analogues (viral DNA polymerase inhibitors): antiherpes drugs (Aciclovir, Brivudine, Famciclovir, Valaciclovir) and antiretroviral drugs (Amprenavir, Lamivudine, Zalcitabine, Zidovudine). Proteinase inhibitors (antiretroviral drugs): Indinavir, Ritonavir. Antiviral drugs for topical use: Aciclovir, Idoxuridine, Interferon alfa, Interferon gamma.

Lecture No. 8. Antiprotozoal, antifungal and anthelmintic drugs. Antiprotozoal drugs. Antimalarial drugs: Quinine, Chloroquine, Pyrimethamine. Anti giardiasis drugs: Chloroquine, Metronidazole, Nifuratel, Paromomycin. Antimycotic drugs. Imidazoles: Bifunazole, Butaconazole, Clotrimazole, Econazole, Ketoconazole. Triazoles: Fluconazole, Itraconazole. Other synthetic antifungals: Ciclopirox, Flucytosine, Mycodermine®, Griseofulvin. Anthelmintics.

Lecture No. 9. Antiseptics and disinfectants. Oxidizing agents: Solutio Hydrogenii peroxydi diluta 3%®, Kalii permanganas, Perform®. Halogen preparations. Chlorine preparations. Iodine preparations. Detergents (surfactants). Phytopreparations: Furin M®, Gingivital®, Maraslavin®, Revulsan®, Rhinolex®. Pharyngeal and stomatoantiseptics: Chlorhexidine (Septadine®), Collustan®, Efisol®, Hexetidine (Hexoral®), Strepsils®, antibiotics (Fusafungine®), antibiotics and local anesthetics (Tyrcine®), antiseptics and local anesthetics (Orofar®, Trachisan®), enzyme preparations (Galepain®, Lyso-6®). Preparations for surgical hand disinfection: C-10, Flandscrub, Hibiscrub, Manuscrub, Manusteryl B, Plivasept blue, Sargosept, Vestrosteril. Preparations for disinfection of the surgical field: Betadine, Braunol, Handscrub, Povidone Jodine, Solutio Iodi spirituosae 5%, Spiritus Vini 70%.

Lecture No. 10. Drugs affecting the respiratory system, uteroactive agents. Antiasthmatic agents. Selective adrenomimetics: Fenoterol, Formoterol, Salbutamol, Salmeterol. Nonselective adrenomimetics: Ephedrine, Epinephrine, Orciprenaline. Inhaled prednisolones: Beclometasone, Budesonide, Fluticasone. Phosphodiesterase inhibitors: Aminophylline, Theophylline. M-cholinolytics: Ipratropium. Leukotrienergetic blockers: Montelukast, Zafirlucast. Mast cell protectors: Ketotifene, Natrii cromoglycas. Aumu-IgE monoclonal antibodies: Omalizumab. Mucolytics: Acetylcysteine, Ambroxol, Bromhexine, Erdosteine. Expectorantia (expectorants). Expectorantia purgantia (expectorants): drugs containing saponins. Expectorantia liquefacientia (liquefying agents): Ammonii chloridum, Kalii iodidum, Liquor Ammonii anisatus® (ammonia anise liquid) ^ Natrii iodidum, Tacholiquin®. Expectorantia emollientia (softening agents): herbal preparations and drugs rich in mucus substances. Expectorantia antiseptica (bronchoantiseptics): herbal preparations and drugs rich in essential oils; Natrii benzoas, Terpinum

hydratum. Antitussiva (drugs against dry cough). Drugs that suppress the cough center: a) non-addictive (Dextromethorphan, Glaucine); b) addictive (Aethylmorphine, Codeine tab. 10 mg, Dihydrocodeine). Peripherally acting agents: Benzonatate, Prenoxidiazine (Libexin®). Combined antitussives. Pulmonary surfactants. Uterotonics. Selective adrenomimetics: Fenoterol (Partusisten®), Hexoprenaline, Salbutamol (Salbupart®). Competitive oxytocin antagonists: Atosiban (Tractocile®).

Lecture No. 11. Drugs affecting the digestive system. Antiulcer drugs. Antacids (alkaline salts). Combined drugs with antacid and mucoprotective effect, containing aluminum and magnesium hydroxide. Antisecretory drugs. Gastroduodenal mucoprotectors. Antihelicobacter agents. Antispasmodics. M-cholinolytics. Myotropic antispasmodics. Combined antispasmodics. Antiemetics. M-cholinolytics. NK1 receptor antagonists. Other antiemetics. Appetite stimulants. Reflex agents. Drugs affecting bile secretion. Interferons. Hepatoprotectors with detoxification activity. Intestinal anti-inflammatory drugs. Purifying (laxative) drugs. Drugs that suppress intestinal peristalsis: Loperamide.

Lecture No. 12. Hypothalamic and pituitary hormones and their analogues, glucocorticoids. Mineralocorticoids. Hypothalamic and adenohypophyseal hormones and their analogues. Neurohypophyseal hormones and analogues. Glucocorticoids. Mineralocorticoids. Thyroactive drugs. Antidiabetic drugs. Anti-obesity drugs. Thyromimetics. Thyrostatics. Antidiabetic drugs. Insulins. Oral antidiabetic drugs. Antihypoglycemic agents. Antiobesity agents. Hypothalamic 5-HT and NA reuptake inhibitors: Sibutramine. Inhibitors of gastric and intestinal lipase. Sex hormones and antihormones. Drugs for the treatment of erectile dysfunction. Anti-aphrodisiacs. Steroid anabolic agents.

Lecture No. 13. Vitamins, chondroprotectors. agents affecting mineral metabolism, antigout agents. Water-soluble vitamins. Fat-soluble vitamins. Multivitamins. Multivitamins and minerals. Multivitamins, minerals and/or a/shgoele.megdai. Chondroprotectors. Agents affecting calcium metabolism. Bisphosphonates. Agents affecting fluorine metabolism. Agents affecting magnesium metabolism. Agents affecting zinc metabolism. Antigout agents. Means for the treatment of acute attacks. Uricostatic agents. Uricosuric agents. Uricolytic agents.

Lecture No. 14. Antitumor agents, immunomodulators. Alkxators. Antimetabolites of: pyrimidine (5-Fluorouracil), purine (Mercaptopurine), folic acid (Methotrexate), DNA polymerase inhibitors (Fludarabine). Cytostatics of plant origin: Vinca-alkaloids (Vinblastine, Vincristine), epipodophyllotoxin derivatives (Etoposide), taxanes (Docetaxel), camptothecins (Irinotecan). Antitumor antibiotics: anthracyclines (Daunorubicin) and others (Bleomycin, Mitomycin C). Hormones and antihormones: estrogens (Polyestradiol), progestins (Medroxyprogesterone), androgens (Testosterone), gonadotropin-releasing analogs (Goserelin), antiestrogens, antiandrogens (Cyproterone, Flutamide), aromatase inhibitors (Aminoglutethimide), GCS (Dexamethasone, Prednisolone); 5-reductase inhibitors (agents that suppress the conversion of testosterone into more active dihydrotestosterone) - Finasteride. Enzymes (protein synthesis inhibitors): L-Asparaginase. Local membrane-active cytotoxic agents: Miltefosine. Immunostimulants. Cytokines and growth factors: colony-stimulating factors, interferons, interleukins, tumor necrosis factors. Immunosuppressants. Azathioprine (Imuran®), Chloroquine (Arthrochin®),

Cyclophosphamide, Cyclosporine A, Mycophenolate, GCS.

Lecture No. 15. Drug interactions, adverse drug reactions. Drug interactions at the pharmaceutical (in vitro) level. Drug interactions at different pharmacokinetic levels: absorption, distribution, metabolism and excretion. Pharmacodynamic interactions: antagonism, synergism, synergoantagonism. Drug interactions with clinical laboratory tests. Drug interactions with electrophysiological diagnostic methods: EEG, ECG. Drug interactions with narcotic drugs (alcohol, nicotine, psychosomimetics). Adverse drug reactions. Side effects associated with features in pharmacodynamics. Side effects associated with features in pharmacokinetics. Side effects associated with altered reactivity of the body: allergy, genetic abnormalities. Mutagenic and carcinogenic effects of some drugs.

3q.

Total: 45q.

EXERCISES

Topic	Hours
FIFTH SEMESTER	
1. Subject of pharmacology. Drugs. Drug - definition and names. Preparations. Pharmacy. Pharmacopoeia. Prescription. Drug information.	3q.
2. Solid dosage forms.	3q.
3. Liquid dosage forms	3q.
4. Soft and gaseous dosage forms.	3q.
5. Seminar and test on general pharmacokinetics and general pharmacodynamics.	3q.
6. COLLOQUIUM on the formulation of dosage forms and general pharmacology.	3q.
7. Cholinergic neurotransmission. Cholinomimetics. M-cholinolytics. Neuromuscular blockers.	3q.
8. Adrenergic neurotransmission. Adrenomimetics. Adrenolytics.	3q.
9. Hypnotics. Sedatives. Antiepileptics. Antiparkinsonian drugs.	3q.
10. Neuroleptics. Anxiolytics.	3q.
11. Antimanic drugs. Antidepressants. Psychostimulants. Nootropics..	3q.
12. COLLOQUIUM on neurotropic drugs.	3q.
13. Opioid analgesics. Antihistamines.	3q.
14. Nonsteroidal anti-inflammatory drugs and non-opioid analgesics.	3q.
Total:	45q.
SIXTH SEMESTER	
1. Seminar, test and prescription tasks on anesthetics and analgesics.	2q.

2. Drugs for the treatment of heart failure. Diuretics.	2ч.
3. Antiarrhythmic drugs. Antianginal drugs. Antimigraine drugs.	2ч.
4. Peripheral vasodilators. Antihypertensive drugs	2ч.
5. Drugs affecting hematopoiesis and blood coagulation.	2ч.
6. COLLOQUIUM on cardiovascular drugs and drugs affecting hematopoiesis and blood coagulation.	2ч.
7. Beta-lactams.	2ч.
8. Aminoglycosides. Tetracyclines. Amphenicols. Macrolides. Lincosamides. Polymyxins, etc..	2ч.
9. Sulfonamides. Antituberculosis agents. Antiviral agents. Immunomodulators.	2ч.
10. Quinolones. Oxyquinolines. Nitrofurans. Antimycotics. Antiprotozoal agents.	2ч.
11. COLLOQUIUM on antimicrobial agents.	2ч.
12. Uteroactive agents. Agents affecting the respiratory system.	2ч.
13. Agents affecting the digestive system.	2ч.
14. Hormonal agents.	2ч.
15. Drug interactions. Adverse drug reactions.	2ч.
Total:	30ч.

THEORETICAL EXAM IN PHARMACOLOGY

I. General pharmacology

1. Subject of pharmacology. Branches. Relationship with other sciences. Historical review.
2. Medicinal raw materials (drugs). Types of medicinal preparations.
3. Medicinal product - definition, origin, names. Medicinal product.
4. Stages in the creation of new drugs.
5. Transmembrane transport of drugs.
6. Absorption of drugs by different routes and methods of administration.
7. Distribution of drugs in the body.
8. Biotransformation of drugs.
9. Excretion of drugs.
10. Drug action and drug effect. Types of drug actions.
11. Receptor and non-receptor action of drugs. Affinity and intrinsic activity.

12. Receptor. Types of receptors. Dependencies: dose - effect and time - effect.
13. Factors on the side of the drug, affecting its kinetics and action. Biopharmaceutics.
14. Importance of age, body weight and sex for the action and kinetics of drugs.
15. Importance of the environment, genetic factors and pathological processes for the action and kinetics of drugs.
16. Features of repeated administration of drugs.
17. Pharmacokinetic drug interactions.
18. Pharmacodynamic drug interactions.
19. Pharmaceutical drug interactions. Drug interactions with clinical and laboratory tests.
20. Side effects of drugs.
21. Toxic effects of drugs.
22. Basic principles of treatment of acute poisoning. Antidote.

II. Special pharmacology

23. Pharmacological influence on cholinergic neurotransmission - levels and mechanisms.
24. Cholinomimetics.
25. M-cholinolytics.
26. Neuromuscular blockers.
27. Pharmacological influence on adrenergic neurotransmission - levels and mechanisms.
28. Adrenomimetics.
29. Alpha-adrenergic blockers.
30. Beta-adrenergic blockers.
31. Antihistamines.
32. Antiserotonin drugs. Drugs affecting the renin-angiotensin-aldosterone system.
33. Eicosanoids and their pharmacological effects.
34. Local anesthetics.
35. General anesthetics.
36. Hypnotics. Sedatives.
37. Antiepileptics.
38. Antiparkinsonians.
39. Drugs for the treatment of Alzheimer's disease.
40. Psychotropic drugs - classification, mechanisms of action, main indications.
41. Neuroleptics.
42. Anxiolytics.
43. Antidepressants. Antimanic drugs.

44. Psychostimulants. Nootropics.
45. Opioid (narcotic) analgesics - classification, pharmacodynamics and toxodynamics. Competitive antagonists of morphine.
46. Opioid (narcotic) analgesics - preparations, pharmacokinetic features, clinical use, side effects.
47. Non-opioid analgesics (non-steroidal anti-inflammatory drugs) - classification, pharmacodynamics, main indications.
48. Non-opioid analgesics are primarily analgesic and antipyretic.
49. Non-opioid analgesics are primarily anti-inflammatory.
50. Heart failure treatment agents.
51. Calcium antagonists.
52. Antiarrhythmic agents.
53. Antianginal (anti-angina) agents.
54. Antihypertensive agents.
55. Peripheral vasodilators. Agents that improve cerebral blood flow.
56. Antimigraine agents.
57. Capillarotonic, venotonic and antihemorrhoidal agents.
58. Antidyslipidemic agents.
59. Diuretics - classification, pharmacodynamics, clinical application.
60. Thiazide diuretics and their analogues. Loop diuretics.
61. Osmotic and potassium-sparing diuretics. Carbonic anhydrase inhibitors. Antidiuretics.
62. Erythropoiesis-stimulating agents. Leukopoiesis-stimulating agents.
63. Types of infusion solutions.
64. Hemostatic (antihemorrhagic) agents.
65. Anticoagulants.
66. Fibrinolytics. Platelet antiaggregants.
67. Antiasthmatic agents.
68. Dry cough agents.
69. Nutritional agents.
70. Antiulcer agents.
71. Antiemetic agents.
72. Appetite-inducing agents. Preparations containing pancreatic enzymes.
73. Bile-secreting agents. Hepatoprotectors.
74. Cleansers. Antidiarrheal agents.
75. Vitamins.
76. Agents affecting calcium and phosphorus metabolism. Antigout agents.

77. Hypothalamic and pituitary hormones - preparations, clinical application.
78. Thyroactive agents.
79. Insulins.
80. Oral antidiabetic agents.
81. Glucocorticoids and mineralocorticoids.
82. Female sex hormones - preparations, clinical application.
83. Hormonal contraceptives.
84. Male sex hormones - preparations, clinical application. Anabolic agents.
85. Agents for the treatment of erectile dysfunction. Drugs used in benign prostatic hyperplasia.
86. Uteroactive agents.
87. Antibiotics - classification, mechanisms, type and spectrum of action.
88. Principles of rational antibiotic therapy and prophylaxis.
89. Penicillins.
90. Cephalosporins.
91. Protected broad-spectrum penicillins and cephalosporins. Carbapenems and monobactams.
92. Aminoglycosides

PRACTICAL EXAM IN PHARMACOLOGY

1. Prescription - parts, types of prescriptions and prescription forms.
2. Prescription - abbreviations and units of measurement.
3. Pharmacopoeia.
4. Tablets. Prescribe: a) Nitroglycerin in 0.5 mg lingual tablets; b) Metronidazole in 500 mg vaginal tablets.
5. Types of tablets. Prescribe: a) Ofloxacin in 400 mg film-coated tablets; b) acetylsalicylic acid (Acidum acetylsalicylicum) in 324 mg effervescent tablets.
6. Tablets with delayed and modified release of substances. Prescribe: a) Isoptin SR in 240 mg tablets; b) Preductal MR in 35 mg tablets.
7. Dragees and capsules. Prescribe: a) Allergosan in dragees of 25 mg; b) Amoxicillin in capsules of 500 mg.
8. Types of powders. Prescribe in the form of powders for oral administration: a) 50 g Natrii hydrocarbonas; b) Coffeinum Natrii benzoas 50 mg and Analgin 500 mg (20 6p.).
9. Types of powders. Prescribe: a) 20 magistral powders for oral administration, containing 10 mg Codeini phosphas; b) 5 g officinal powder Topocin for external use.
10. Solutions. Prescribe: a) 4% 150 ml Natrii citras in the form of a solution for oral administration (1 tablespoon 3-4 times a day) in an abbreviated and unabridged version; b)

5% 100 g of alcoholic iodine solution (*Solutio Iodi spirituosae*) for disinfection of the operative field.

11. Mixtures. Prescribe one vial (140 ml) of Tussiol. Indicate: 1 tablespoon every 8 hours.

12. Prescribe 225 g of a mixture containing infusion of primrose roots (*Infusi rad. Primulae* 6.0/180.0), Ephedrini hydrochloridum, ammonia-anise liquid (*Liquor Ammonii anisatus*), Natrii benzoas and marshmallow syrup (*Sirupus Althaeae*). The single doses of ephedrine, ammonia-anise liquid and sodium benzoate are 20 mg, 200 mg and 200 mg respectively. Indicate: 1 tablespoon 3 times a day.

13. Drops. Prescribe: a) 20 g *Tinctura Valerianae*; b) 0.1% solution of Xylometazoline in 10 ml vials.

14. Suspensions. Prescribe one vial of Cefuroxime in the form of granules for the preparation of an oral suspension (25 mg/ml) for a child weighing 10 kg (the DOS of cefuroxime for children under 12 years of age is 10 mg/kg, divided into two oral doses every 12 h).

15. Infusions and decoctions. Prescribe a decoction of bearberry leaves.

16. Liquid dosage forms for injection. Prescribe ten ampoules of Pethidine (5% 2 ml) on a yellow prescription form.

17. Prescribe 20 dry vials of Benzylpenicillin 500,000 UI each in a saline solution (*Solutio Natrii chloridum* 0.9% 10 ml; 100,000 UI/1 ml solvent).

18. Prescribe one vial each: a) Fentanyl (0.005% 10 ml); b) Droperidol (0.25% 10 ml). Calculate the dose of each drug in mg contained in 2 ml of aqueous solution.

19. Ointments. Prescribe: a) 2.5 g Nemybacin in the form of an officinal eye ointment; b) 30 g of a magisterial skin ointment containing 2 g *Acidum salicylicum* and 4 g *Acidum benzoicum*, for the treatment of epidermophytia and trichophytia.

20. Pastes. Prescribe 100 g of officinal zinc paste.

21. Cream and gel. Prescribe: a) Lamisil 1% 15 g in the form of an officinal cream; b) Troxevasin 2% 40 g in the form of a gel.

22. Suppositories. Prescribe one box of officinal suppositories: a) Paracetamol 150 mg; b) Ultraproct.

23. Transdermal therapeutic systems (TTS). Prescribe 10 patches, releasing 50 mcg/h Fentanyl.

24. Aerosol dosage forms. Prescribe: a) one vial of Fluticasone (Flixonase) 0.05% 100 g in the form of a nasal aerosol; b) one vial of Salbutamol (Ventolin 0.1 mg/dose) in the form of an aerosol for inhalation into the mouth.

25. Calculate the volume of distribution of propranolol, considering that after a single oral administration of 30 mg, its equilibrium plasma concentration is 100 ng/ml.

26. Calculate the loading dose of lidocaine, which should be administered intravenously over 2 min., to a patient with ventricular tachycardia and a body weight of 70 kg, considering that the volume of distribution of the drug is 0.5 l/kg, and its equilibrium plasma concentration is 2 mg/l.

27. With normal renal function, gentamicin has a plasma half-life of 2 h and a dosing interval of 8 h. In how many hours should this antibiotic be administered to a patient with a urinary tract infection and impaired renal function, which has led to an extension of the plasma half-life of the drug to 15 h?

28. Prescribe in the form of eye drops 2% 10 ml of M-cholinomimetic with direct action (atropine, timolol, pilocarpine).
29. Prescribe in ampoules for subcutaneous injection a Bulgarian preparation representing a reversible cholinesterase blocker (carbachol, galantamine, atropine).
30. Prescribe in ampoules of 1 mg/1 ml a M-cholinolytic of natural origin (pyridostigmine, atropine, butylscopolamine).
31. Prescribe in vials of 0.3% 10 ml of a neuromuscular blocker with non-depolarizing action (tubocurarine, galantamine, suxamethonium).
32. Prescribe in tablets of 5 mg of alpha1-adrenomimetic (midodrine, xylometazoline, ephedrine).
33. Prescribe in vials 0.1% 10 ml nasal decongestant with alpha-adrenomimetic action (pilocarpine, furotalgin, naphazoline).
34. Prescribe an adrenomimetic that activates alpha-, beta1-, and beta2-adrenergic receptors
35. Prescribe in tablet form 2 mg of an antiasthmatic drug that rarely causes tachyarrhythmia (isoprenaline, salbutamol, orciprenaline).
36. Prescribe a selective beta-adrenergic blocker in 50 mg tablets (metoprolol, salbutamol, propranolol).
37. Prescribe a beta1-adrenergic blocker with negligible lipid solubility in 25 mg tablets (propranolol, oxprenolol, atenolol).
38. Prescribe a sympatholytic that activates mainly the central alpha-adrenergic receptors in 0.15 mg tablets (reserpine, nebivolol, clonidine).
39. Prescribe in tablets 1 mg of a selective alpha1-adrenergic blocker (etylephrine, prazosin, carvedilol).
40. Prescribe a second-generation H1-receptor blocker without sedative effect in 10 mg tablets (promethazine, loratadine, ranitidine).
41. Prescribe in ampoules 1% 10 ml synthetic local anesthetic, also used for the treatment of ventricular arrhythmias (procaine, amiodarone, lidocaine).
42. Prescribe on a green form a preparation with euhypnotic effect, representing a benzodiazepine derivative (glutethimide, zolpidem, nitrazepam).
43. Prescribe drops containing 5 g each of tinctures of mint (*Mentha piperita*), hawthorn (*Crataegus monogyna*) and valerian (*Valeriana officinalis*).
44. Prescribe a hydantoin derivative in 100 mg tablets with antiepileptic and antiarrhythmic activity (phenobarbital, ethosuximide, phenytoin).
45. Prescribe a succinimide antiepileptic drug in 250 mg capsules, used to treat absence seizures (diazepam, ethosuximide, carbamazepine).
46. Prescribe on a green form a drug for parenteral administration to a patient with a grand mal seizure (ethosuximide, sodium valproate, phenobarbital).
47. Prescribe on a green form a benzodiazepine anxiolytic in ampoules, also used to treat status epilepticus (bromazepam, diazepam, flumazenil).
48. Prescribe a drug in 200 mg tablets to a patient with trigeminal neuralgia (morphine, carbamazepine, chlorpromazine).

49. Prescribe an antiparkinsonian drug in 5 mg tablets, inhibiting MAO (bromocriptine, selegiline, biperiden).
50. Prescribe a neuroleptic for the relief of acute psychomotor agitation in 5 mg/1 ml ampoules (chlordiazepoxide, thioridazine, haloperidol).
51. Prescribe a benzodiazepine anxiolytic with a weak euhypnotic effect (midazolam, medazepam, hydroxyzine) on a green prescription form in 10 mg tablets.
52. Prescribe a drug for the treatment of depression that selectively inhibits serotonin neuronal uptake in 20 mg capsules (fluoxetine, moclobemide, imipramine).
53. Prescribe a drug with nootropic action in 400 mg capsules (flunarizine, fluoxetine, piracetam).
54. Prescribe an analgesic that is dispensed on a yellow prescription form, in 5% 2 ml ampoules and in 25 mg tablets (metamizole, diclofenac, pethidine).
55. Prescribe a non-opioid analgesic from the aniline group for headache relief in 500 mg tablets (acetylsalicylic acid, paracetamol, indomethacin).
56. Prescribe a non-steroidal anti-inflammatory agent, an indole derivative, in the form of 25 mg film-coated tablets (ibuprofen, meloxicam, indomethacin).
57. Prescribe a cardiac glycoside in 0.25 mg/ml ampoules for intravenous administration (dobutamine, digoxin, methyl digoxin).
58. Prescribe a platelet antiaggregant that inhibits the formation of thromboxane A₂ in 100 mg tablets (acenocoumarol, acetylsalicylic acid, clopidogrel).
59. Prescribe a coronary dilator for the treatment of angina pectoris in the form of an aerosol in vials of 400 mcg/dose (nifedipine, glyceryl trinitrate, dipyridamole).
60. Prescribe in tablets of 120 mg an antiarrhythmic drug from the group of calcium antagonists, suitable for the treatment of supraventricular arrhythmias only (bisoprolol, ivabradine, verapamil).
61. Prescribe an antihypertensive drug in tablets of 25 mg, representing a non-selective beta-adrenergic blocker with membrane-stabilizing activity (metoprolol, atenolol, propranolol).
62. Prescribe an antihypertensive drug in tablets of 10 mg, blocking angiotensin-1-convertase (nifedipine, enalapril, losartan).
63. Prescribe a combined antihypertensive drug containing enalapril and hydrochlorothiazide.
64. Prescribe a calcium antagonist that improves cerebral blood flow in 30 mg tablets (naftidrofuryl, alprostadiol, nimodipine).
65. Prescribe a selective 5-HT_{1c} receptor agonist used to treat migraine in 50 mg film-coated tablets (ergotamine, sodium valproate, sumatriptan).
66. Prescribe a venotonic drug in the form of capsules of 300 mg, representing a semi-synthetic derivative of rutin (lyoton 1000, peflavit C, troxevasin).
67. Prescribe a combined capillarotonic drug obtained from St. John's wort in film-coated tablets (cndothelon, peflavit C, detralex).
68. Prescribe a long-acting diuretic (hydrochlorothiazide, furosemide, chlorthalidone).
69. Prescribe a loop diuretic (mannitol, spironolactone, furosemide) in ampoules of 20 mg/2 ml.

70. Prescribe an osmotic diuretic in vials of 10% 500 ml (furosemide, magnesium sulfate, mannitol).
71. Prescribe an iron preparation in the form of sulfate for oral administration in film-coated tablets of 325 mg (venofer, epoetin alfa, hemofer prolongatum).
72. Prescribe a vitamin preparation for the treatment of megaloblastic anemia in ampoules of 250 meg (folic acid, cyanocobalamin, phytomenadione).
73. Prescribe in the form of a solution for injection in pre-filled syringes of 3000 UI/0.3 ml an antianemic agent for a patient on hemodialysis with chronic renal failure (tardiferon, eprex, chloramphenicol).
74. Prescribe in vials of 300 mcg/1 ml a preparation for subcutaneous injection that stimulates leukopoiesis (chloramphenicol, filgrastim, cyclophosphamide).
75. Prescribe an electrolyte solution for intravenous infusion (gelofusin, intralipid, Hartmann's solution).
76. Prescribe a preparation for topical application that has hemostatic and antiseptic effects (gelaspon, hydrogen peroxide, fraxiparine).
77. Prescribe a coagulant in ampoules of 10 mg/1 ml (heparin, phytomenadione, ticlopidine).
78. Prescribe an anticoagulant that has indirect action in tablets of 4 mg (heparin, acenocoumarol, phytomenadione).
79. Prescribe a preparation for subcutaneous injection, which is a low molecular weight derivative of heparin, for the prevention of phlebothrombosis in syringe ampoules of 0.3 ml (warfarin, fraxiparine, alteplase).
80. Prescribe an antiasthmatic drug that blocks phosphodiesterase in ampoules of 2.4% 10 ml for intravenous administration (salbutamol, ketotifen, aminophylline).
81. Prescribe a mucolytic drug in tablets of 8 mg (bromhexine, libexin, glaucine).
82. Prescribe an antitussive drug in tablets of 100 mg, reducing the excitability of receptors in the mucous membrane of the respiratory tract (butamirate, codeine, libexin).
83. Prescribe an antacid drug in the form of tablets of 500 mg (sucralfate, misoprostol, hydrotalcite).
84. Prescribe a drug containing a balanced gel of aluminum and magnesium hydroxide in vials of 170 ml.
85. Prescribe an antiulcer drug, which is a proton pump inhibitor in the parietal cells of the stomach, in the form of 20 mg capsules (pirenzepine, famotidine, omeprazole).
86. Prescribe in tablets of 8 mg an antiemetic agent, which is a selective antagonist of 5-HT₃-ergic receptors (domperidone, metoclopramide, ondansetron).
87. Prescribe in film-coated tablets of 5 mg a synthetic contact colon cleanser with a slow effect (castor oil, magnesium sulfate, bisacodyl).
88. Prescribe an osmotic laxative in the form of powders in sachets of 10 g for a pregnant woman (castor oil, lactitol, loperamide).
89. Prescribe an antidiarrheal drug, stimulating peripheral opioid receptors, in capsules of 2 mg (diosmectite, lactulose, loperamide).
90. Prescribe in capsules of 100 mg of a hepatoprotective agent containing bi-flavonoids (isoniazid, silymarin, essentielle forte N).

91. Prescribe in tablets of 400 mg of a drug with selective spasmolytic activity on the extrahepatic bile ducts (drotaverine, chimecromone, morphine).
92. Prescribe in film-coated tablets a drug containing pancreatic enzymes with moderate lipolytic activity.
93. Prescribe a vitamin drug in vials of 200,000 UI/10 ml for the prevention of rickets (retinol, cholecalciferol, sodium fluoride).
94. Prescribe a fluorine drug in tablets of 0.55 mg for the prevention of dental caries in children over 5 years of age (calcium sandoz forte, fluorine, calcitriol).
95. Prescribe a xanthine oxidase inhibitor in 100 mg tablets (allopurinol, colchicine, hydrochlorothiazide).
96. Prescribe a 25 mg tablet for the treatment of myxedema (propylthiouracil, levothyroxine, thiamazole).
97. Prescribe a synthetic thyreostatic in 5 mg tablets (betamethasone, triiodothyronine, thiamazole).
98. Prescribe a rapid-acting insulin suitable for the treatment of hyperglycemic coma (humulin R, humulin M, humulin L).
99. Prescribe an oral sulfonylurea antidiabetic with a prolonged effect in 5 mg tablets (metformin, glibenclamide, rosiglitazone).
100. Prescribe a glucocorticoid, which is a fluorinated prednisolone preparation in 0.5 mg tablets (dehydrocortisone, fludrocortisone, betamethasone).
101. Prescribe a glucocorticoid preparation in dry ampoules for the treatment of anaphylactic shock (flucinar, prednisolone, methylprednisolone).
102. Prescribe a skin ointment containing fluocinolone and neomycin (flucinar, miconazole, flucinar N).
103. Prescribe a hormonal contraceptive preparation for oral administration (estra-comb, cilest, sildenafil).
104. Prescribe a steroid anabolic preparation in 5 mg tablets (tribestan, testosterone, bionabol).
105. Prescribe a selective alpha-blocker that improves micturition disorders in patients with benign prostatic hyperplasia, in capsules of 0.4 mg (tameulosin, prazosin, propranolol).
106. Prescribe a uterokinetic hormonal preparation in ampoules of 5 UI/1 ml (oxytocin, salbutamol, methylergobrevin).
107. Prescribe a tocolytic preparation in ampoules of 0.5 mg/10 ml (estradiol, methylergobrevin, fenoterol).
108. Prescribe 1,000,000 UI of an acid-resistant penicillin preparation in tablets to a patient with angina (benzylpenicillin, phenoxymethylpenicillin, azithromycin).
109. Prescribe an antibiotic for parenteral administration in vials of 1,000,000 UI to a patient with an acute rheumatic attack (acyclovir, benzylpenicillin, benzathine benzylpenicillin).
110. Prescribe a broad-spectrum penicillin preparation for the treatment of Pseudomonas-urinary infection in dry vials of 1 g (gentamicin, carbenicillin, ampicillin).
111. Prescribe a penicillinase-resistant semi-synthetic penicillin preparation in capsules of 500 mg (mezlocillin, cloxacillin, piperacillin).

112. Prescribe a broad-spectrum semisynthetic aminopenicillin preparation with high intestinal absorption for a baby weighing 8 kg (ampicillin, amoxicillin, co-trimoxazole).
113. Prescribe amoxicillin potentiated with clavulanic acid in 375 mg tablets for a patient with mixed urinary tract infection (augmentin, tazocin, sulperazone).
114. Prescribe a first-generation cephalosporin preparation for oral administration (cephalexin, cefuroxime, cefoperazone).
115. Prescribe a third-generation cephalosporin preparation with significant urinary and biliary excretion and a long plasma half-life in 1 g vials (cefepime, imipenem, ceftriaxone).
116. Prescribe an aminoglycoside antibiotic in ampoules of 80 mg/2 ml for the treatment of gram-negative urinary tract infection (spiramycin, gentamicin, ciprofloxacin).
117. Prescribe an antibiotic that is harmless to the fetus for a pregnant woman with an upper respiratory tract infection (doxycycline, amikacin, amoxicillin).
118. Prescribe a macrolide antibiotic, also used in the complex therapy of peptic ulcer disease, in film-coated tablets of 500 mg (phenoxymethylpenicillin, cephalexin, clarithromycin).
119. Prescribe an antifungal antibiotic for the treatment of candidiasis caused by broad-spectrum antibiotics (nystatin, griseofulvin, clotrimazole).
120. Prescribe a combined preparation containing sulfamethoxazole and trimethoprim (tienam, co-trimoxazole, rodozil).
121. Prescribe a fluorinated quinolone preparation in film-coated tablets of 250 mg for an adult with a urinary tract infection (augmentin, ciprofloxacin, azithromycin).
122. Prescribe an antituberculosis preparation, which is isonicotinic acid hydrazide, in tablets of 100 mg (isoniazid, ethambutol, rifampicin).
123. Prescribe an antituberculosis antibiotic that has advantages over streptomycin (pyrazinamide, rifampicin, ethambutol).
124. Select and prescribe a rational combination of two antibiotic preparations (amoxicillin and tetracycline, amikacin and tobramycin, ampicillin and oxacillin).
125. Prescribe an antitrichomonas preparation in tablets of 500 mg, administered once orally (tinidazole, fluconazole, efizole).
126. Prescribe in vials 0.5% 100 ml antimicrobial chemotherapeutic agent, administered intravenously, for the treatment of anaerobic infections (metronidazole, ketoconazole, tinidazole).
127. Prescribe in tablets 250 mg of a preparation with hematoschizotropic and immunosuppressive effect for chemoprophylaxis of all forms of malaria (zidovudine, doxycycline, chloroquine).
128. Prescribe in dry vials 250 mg, administered intravenously for the treatment of encephalitis caused by herpes simplex (acyclovir, indinavir, rimantadine).
129. Prescribe in capsules 100 mg, a chemotherapeutic agent for the treatment of AIDS, inhibiting viral polymerases (voriconazole, zidovudine, rimantadine).
130. Prescribe a combined preparation in lozenges containing 250 mg of dec-valine and 30 mg of ascorbic acid, for disinfecting the mucous membrane of the oral cavity and pharynx (efisol, phenoxymethylpenicillin, chlorhexidine).

131. Prescribe a synthetic anticestode preparation in 500 mg tablets for the treatment of taeniasis (albendazole, niclosamide, pyrantel).
132. Prescribe a preparation in 250 mg tablets for a single administration to a child weighing 25 kg, suffering from enterobiasis (niclosamide, praziquantel, pyrantel).
133. Prescribe a cytostatic with alkylating antitumor activity in 50 mg tablets to an adult with lung carcinoma (cyclophosphamide, methotrexate, doxorubicin).
134. Prescribe a heparin-inactivating drug in 1% 5 ml ampoules for intravenous administration (penicillamine, obidoxime, protamine).
135. Prescribe in ampoules of 0.4 mg/1 ml a preparation representing a complete competitive antagonist of morphine (nalorphine, naloxone, flumazenil).

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