

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 hypertensions, 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. Rumyana 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, cardiostimulant, 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 2ч.
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: antihypertensive 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.

Lecture No. 8. Adrenolytics. Alpha-adrenergic blockers: antihypertensive selective 2ч.
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.

Lecture No. 9. Autacoids (tissue hormones and mediators) and their 2
pharmacological effects. Histamine and antihistamines. Histamine biosynthesis,
tissue distribution and metabolism. Histaminergic receptors types, organ localization
and effects associated with their activation. H₁-blockers of the I generation:
Chlorpyramine (Allergosan), Cyproheptadine, Clemastine, Dimetindene,
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): Iprazochrome, Pizotifen.
Setrons: Ondansetron, Tropisetron. Inhibitors of neuronal uptake (uptake I) of 5-HT
(antidepressants): Fluoxetine, Fluvoxamine, 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).

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

(Methohexital), thiobarbiturates (Thiopental) and others (Etomidate, Propofol). Injectable anesthetics-hypnotics with an analgesic effect: Keta-mine, Propomidide. Local anesthetics. Alkaloids: Cocaine. Cocaine addiction. PABA esters: Benzocaine, Procaine, Proxymetacine, 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 Melissae (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. Pa-paver somniferum and phenanthrene alkaloids of opium. Opioidergic 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 Adonidis 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.

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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. Acebutolol, 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 β -blockers. Non-selective β -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.

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.

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

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.

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Lecture No. 8. Antiprotozoal, antifungal and anthelmintic drugs. Antiprotozoal drugs. Antimalarial drugs: Quinine, Chloroquine, Pyrimethamine. Antigiardiasis drugs: Chloroquine, Metronidazole, Nifuratel, Paromomycin. Antimycotic drugs. Imidazoles: Bifunazole, Butaconazole, Clotrimazole, Econazole, Ketoconazole. Triazoles: Fluconazole, Itraconazole. Other synthetic antifungals: Ciclopirox, Flucytosine, Mycodermin®, 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, Manusterol B, Plivasept blue, Sargosept, Ventrosteril. Preparations for disinfection of the surgical field: Betadine, Braunol, Handscrub, Povidone Jodine, Solutio Iodi spirituosae 5%, Spiritus Vini 70%.

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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

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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 adenohipophyseal 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, synergism/antagonism. Drug interactions with clinical laboratory tests. Drug interactions with electrophysiological diagnostic methods: EEG, ECG. Drug interactions with narcotic drugs (alcohol, nicotine, psychosimulants). 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.

Total: 45ч.

EXERCISES

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

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 Tussirol. 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, furotalin, 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 (chlor diazepoxide, 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, alprostadil, 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 (endothelon, 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, efazole).
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).

REFERENCES

1. Pharmacology and Drug Toxicology Volume 1 and Volume 2, Edited by Prof. Dr. Rumen Nikolov, MD and Prof. Dr. Slavina Surcheva, MD, Reviewers: Prof. Dr. Krasimira S. Yakimova, MD and Prof. Dr. Ivanka Kostadinova, MD, 2022
2. Collection of test questions and prescription tasks in pharmacology for medical students, edited by Assoc. Prof. Delev and Assoc. Prof. Kostadinov, Plovdiv, 2018.
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4. Pharmacology for assistant pharmacists, nurses and midwives, edited by Prof. Kostadinova and Prof. Peychev, Plovdiv, 2017.
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8. Drugs, Pregnancy and Breastfeeding. N. Boyadzhieva and I. Lambev, Sofia, 2006.

Compiled by:

(Assoc. Prof. Stefan Harkov)

Approved by a decision of the Council of the Department of "Pediatrics, Pharmacology, Infectious Diseases, Epidemiology and Tropical Diseases ", Protocol № 9/ 04.07.2025 год.

Head of department:

(Assoc. Prof. Svetoslav Cenov)

Approved by a decision of the Faculty Council of the Medical Faculty, Protocol № 26/ 09.07.2025 год.

Secretary of the Council of the Medical Faculty:

(Chief Assist. Prof. Ruska Nenkova, PhD)

BURGAS STATE UNIVERSITY "PROF. DR. ASSEN ZLATAROV"
FACULTY OF MEDICINE
DEPARTMENT "INTERNAL DISEASES, SOCIAL MEDICINE,
PHYSIOTHERAPY AND REHABILITATION, DISASTER MEDICINE"

Approved by!

DEAN:

(Prof. Romyana Yankova, PhD)

CURRICULUM

Academic discipline:	PROPAEDEUTICS OF INTERNAL DISEASES
Specialty:	MEDICINE
Field of higher education:	7.1. MEDICINE
Educational and qualification degree:	MASTER
Form of education:	Full-time

Burgas, 2025

1. GENERAL PARAMETERS OF THE DISCIPLINE					
Total (academic hours)::		360	ECTS:		12
Auditorium classes	Non-auditorium classes		Auditorium ECTS	Non-auditorium ECTS	
240	120		8.0	4.0	
Type of subject:	Number of hours per week: (lectures + practicals)		Course:	Semester:	
Mandatory	2+2/6+6		III	V and VI	
2. STUDY FORMS					
Auditorium classes:	Academic hours	ECTS	Non-auditorium classes:		Academic hours ECTS
Lectures	60	2.0	Consultations		60 2.0
			Work with a teacher		
			Self- study work		
Practical sessions	180	6.0	- preparing an abstract/report - preparation of exercises;		40 20 1.3 0.7
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 of classes (practical exercises)				0.25	
- Active participation in Educational/Scientific activities				0.25	
- Ongoing control (colloquium, tests)				0.5	

ANNOTATION

The academic discipline "Propaedeutics of Internal Diseases" is mandatory for students of the specialty "Medicine", third year, full-time form of education.

Purpose of the Discipline:

The discipline "Propaedeutics of Internal Diseases" is fundamental in the curriculum of the medical education. It provides knowledge about patient examination methods – anamnesis, physical examination, instrumental, and laboratory tests; the approach and logic in formulating a diagnosis and the methodology of the diagnostic process; symptomatology and syndromology of internal diseases; clinical presentation; fundamental principles of treatment, complications, and prognosis.

Aim and objectives:

The aim of the training in the discipline "Propaedeutics of Internal Diseases" is for students to acquire basic theoretical knowledge and practical skills that form the basic for diagnostics and clinical thinking in the field of internal medicine. By mastering the methods of collecting anamnesis, performing a physical examination and recognizing basic symptoms and syndromes, students prepare themselves for independent work with a patient and for their subsequent training in clinical disciplines.

The training also aims to develop professional communication, ethical behaviour, and proper medical record keeping, which are essential key components of medical practice.

Main Tasks of the Curriculum:

- Mastering methods for clinical examination and establishing a clinical diagnosis in internal diseases.
- Learning methods for collecting anamnesis: Developing skills for effective and targeted patient interviews. Taking into account subjective complaints in the context of general condition and medical history. Conducting an independent complete physical examination of patients. Recognition of normal and pathological findings.
- Understanding the clinical presentation, history taking, physical status, instrumental and laboratory tests for internal diseases.
- Creating diagnostic plans (algorithms), making diagnoses and forming a prognosis for diseases.

Expected learning outcomes:

Upon completion of the discipline "Propaedeutics of Internal Diseases", students should have the following theoretical knowledge:

- Taking medical history record and performing all physical examination methods.
- Methods for physical and instrumental examination of the respiratory system and related diseases.
- Medical history and physical examination of the cardiovascular system; normal ECG, rhythm and conduction disorders, echocardiography, arterial and venous assessment, and peripheral pulse.
- Diseases of the cardiovascular system, gastrointestinal tract, kidneys, blood, endocrine and metabolic systems.
- Physical examination of the kidneys, thyroid gland, instrumental and physical examination of the gastrointestinal system.
- Diagnosis and examination of patients with joint diseases – rheumatoid arthritis, arthrosis, and systemic connective tissue diseases.

- Knowledge of both classical and modern diagnostic methods in internal medicine.

Practical skills:

- independent history taking in patients;
- mastering the physical methods of examining the patient (inspection, palpation, percussion, auscultation)
- physical examination of the lungs;
- physical examination of the heart and peripheral pulse;
- physical examination of the abdomen and abdominal organs;
- physical examination of a patient with endocrine diseases;
- physical examination of a patient with bone and joint diseases;
- independent reading of normal and pathological ECG;
- analysis of deviations in laboratory results in internal diseases;

Teaching methods

- Traditional (passive) methods: presentation of the study material through a lecture, demonstration, and good clinical 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) with the aim of deeper understanding of the specific material.

Forms of self-study: abstract-type coursework, tasks for independent solution on topics from practical classes, solving tests assignments, colloquiums.

Assessment methods

When assessing the students' knowledge, a combination of modern and classical methods is applied.

Current control:

- Oral examination before the practical session
- Tests
- Seminar sessions - discussions
- Evaluation and certification of the protocols at the end of the exercise
- Colloquium with a test part and oral examination

Semester exam:

- Test
- Practical exam
- Theoretical exam with a written part, stored in the department's archives, and an oral part before a committee of habilitated lecturers.

The assessment of the students' achievements in their training is achieved through ongoing control - 3 tests and 6 colloquiums per year. The final semester exam in propaedeutics of internal medicine is conducted in 3 phases: test, practical exam and oral theoretical exam.

CURRICULUM CONTENT

LECTURES

Topic	hours
1. History and present status. Objective examination methods.	2
2. Main symptoms and syndromes in diseases of the respiratory system.	2
3. Acute and chronic bronchitis. Pulmonary emphysema. COPD.	2
4. Bronchial asthma.	2
5. Pneumonia, abscesses, bronchiectasis.	2
6. Pulmonary tuberculosis.	2
7. Pulmonary thromboembolism.	2
8. Lung cancer.	2
9. Main symptoms and syndromes and methods of examination in diseases of the cardiovascular system.	2
10. Acquired valvular diseases - part I.	2
11. Acquired valvular diseases - part II.	2
12. Arterial hypertension.	2
13. Ischemic heart disease- stable angina.	2
14. Acute coronary syndrome - unstable angina, myocardial infarction.	2
15. Heart failure.	2
16. Physical examination of the abdomen - inspection, palpation, percussion, auscultation. The most important clinical-chemical, immunological and instrumental methods for examining the esophagus, stomach and intestines.	2
17. Symptoms and syndromes in diseases of the esophagus, stomach and intestines.	2
18. Main diseases of the esophagus, stomach, small and large intestines.	2
19. Symptoms and syndromes of diseases of the liver, biliary system and pancreas	2
20. Physical examination of the liver, biliary system and pancreas.	2
21. Chronic hepatitis, liver cirrhosis, cholelithiasis, acute and chronic pancreatitis.	2
22. Main symptoms and syndromes and methods of examination of the urinary system.	2
23. Main diseases of the kidneys and urinary tract.	2
24. Anemias - physical and laboratory methods of examination.	2
25. Leukemias and myeloproliferative diseases - physical, laboratory and instrumental methods of examination.	2
26. Lymphomas, blood clotting disorders.	2
27. Endocrine system. Diseases of the pituitary gland and adrenal glands.	2
28. Endocrine system. Diseases of the thyroid gland.	2
29. Diabetes mellitus.	2
30. Diseases of the musculoskeletal system.	2
Total:	60

PRACTICAL LESSIONS

Topic	hours
1. Anamnesis/ case history	3
2. General status. Head and neck status.	3
3. Physical examination of the lungs.	3
4. Physical examination of the cardiovascular system.	3
5. Physical examination of the cardiovascular system.	3
6. Physical examination of the urinary system, endocrine glands and patients with hematological diseases.	3
7. Colloquium on the study of the lung and cardiovascular system.	3
8. Colloquium on the study of the abdomen, urinary system, endocrine glands and patients with hematological diseases.	3
9. COPD. Chronic bronchitis and emphysema.	3
10. Bronchial asthma.	3
11. Types of pneumonia.	3
12. Pleurisy.	3
13. Lung cancer.	3
14. Pulmonary thromboembolism.	3
15. Tuberculosis.	3
16. Lung abscess.	3
17. Acute and chronic heart failure.	3
18. Ischemic heart disease. Angina pectoris. Ischemic cardiomyopathy.	3
19. Ischemic heart disease. Acute coronary syndrome.	3
20. Arterial hypertension.	3
21. Endocarditis.	3
22. Myocarditis.	3
23. Pericarditis.	3
24. Acquired mitral defects.	3
25. Acquired aortic defects.	3
26. ECG norm and pathological changes.	3
27. Clinical laboratory.	3
28. Clinical laboratory.	3
29. Clinical laboratory.	3

30. Clinical laboratory	3
31. Diseases of the esophagus.	3
32. Chronic gastritis. Peptic ulcer disease.	3
33. Gastric carcinoma.	3
34. Diseases of the small intestine.	3
35. Diseases of the large intestine.	3
36. Chronic hepatitis.	3
37. Liver cirrhosis.	3
38. Liver cirrhosis.	3
39. Cholelithiasis. Cholecystitis.	3
40. Pancreatitis - acute and chronic.	3
41. Glomerulonephritis - acute and chronic.	3
42. Pyelonephritis - acute and chronic. Nephrolithiasis.	3
43. Kidney tumors. Kidney involvement in systemic diseases.	3
44. Anemias - types.	3
45. Myeloproliferative, myelodysplastic diseases.	3
46. Lymphomas.	3
47. Blood clotting. Hemorrhagic diatheses.	3
48. Pituitary gland diseases.	3
49. Thyroid and parathyroid gland diseases.	3
50. Adrenal gland diseases.	3
51. Diabetes mellitus. Hyperlipoproteinemias.	3
52. Collagenoses.	3
53. Rheumatoid arthritis.	3
54. Review.	3
55. Review.	3
56. Clinical laboratory.	3
57. Clinical laboratory.	3
58. Clinical laboratory	3
59. Clinical laboratory	3
60. Clinical laboratory	3
Total:	180

EXAM SCHEDULE
for the exam in "PROPAEDEUTICS OF INTERNAL DISEASES"
for students of the specialty "Medicine"

Part I - practical exam

Clinical methods for examining the patient

1. Anamnesis - rules for taking the anamnesis, parts of the anamnesis.
2. Physical examination methods - examination, palpation, percussion, auscultation.
3. Current condition /status present/ - plan.
4. General condition of the patient - general examination, mental state, body position, posture and gait, height and build, bone and muscular system, security, body mass. Changes in the skin, skin appendages and mucous membranes. Body temperature, types of temperature curves and their clinical significance.
5. Examination of the head and neck, lymph nodes - pathological changes, diagnostic value.
6. Clinical methods for examining a pulmonary patient - history, physical examination - pathological changes, diagnostic value.
7. Clinical methods for examining the cardiovascular system - history, physical examination, pathological changes, diagnostic value.
8. Examination of arteries and veins - diagnostic value of pathological changes.
9. Clinical methods for examining the urinary system - history, physical examination, pathological changes, diagnostic value.
10. Physical methods for examining the abdomen - pathological abnormalities, diagnostic value.
11. Clinical methods for examining the gastrointestinal tract - history, physical examination, pathological abnormalities, diagnostic value.
12. Clinical methods for examining a liver patient - history, physical examination, pathological abnormalities, diagnostic value.
13. Clinical methods for examining patients with diseases of the gallbladder and bile ducts - pathological abnormalities, diagnostic value.
14. Clinical methods for examining the pancreas - history, physical examination, pathological abnormalities, diagnostic value.
15. Physical examination of the spleen. Splenomegaly - the most common diseases.
16. Examination of patients with diseases of the thyroid gland and adrenal glands - history, physical and laboratory examinations.
17. Examination of patients with diseases of the musculoskeletal system: history, physical and laboratory examinations, pathological abnormalities, diagnostic value.

Part II - laboratory, functional and instrumental methods of examination

18. Functional examination of the respiratory system. Methods of examination of the respiratory system - radiography, bronchoscopy. Respiratory failure - etiology, pathogenesis, clinical picture.
19. Pleural puncture, examination of punctates.
20. Electrocardiography - pathological changes in heart rhythm disorders, cardiac conduction, changes in IHD - angina, myocardial infarction.
21. Functional and instrumental methods for examining the heart - bicycle ergometry, echocardiography, radioisotope examination, catheterization, angiocardiology - diagnostic possibilities.
22. Functional examination of the kidneys - concentration and dilution tests, clearance studies, radioisotope studies - diagnostic value.
23. Instrumental methods for examining the digestive system - fibrogastroscopy, fibrocolonoscopy, rectoscopy - diagnostic value.
24. Laboratory tests in liver diseases - diagnostic value.
25. Abdominal ultrasound, liver biopsy, CAT and MRI - diagnostic options.
26. Functional examination of the endocrine system.
27. Functional examination of the musculoskeletal system.

Part III – basic internal diseases

28. Acute respiratory diseases. Acute tracheobronchitis, acute bronchitis - etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
29. COPD - etiology, pathogenesis, clinical forms, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
30. Bronchiectasis - etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
31. Bronchial asthma - etiology, pathogenesis, pathomorphology, clinical picture, clinical forms, treatment and diagnostic plan, diagnosis.
32. Pneumonia - croupous pneumonia.
33. Pneumonia - bronchopneumonia.
34. Pneumonias - interstitial pneumonias.
35. Pulmonary thromboembolism - etiology, pathogenesis, pathomorphology, clinical picture, clinical forms, treatment and diagnostic plan, diagnosis.
36. Lung cancer - classification, etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
37. Pleurisy - classification, etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
38. Pulmonary tuberculosis - primary forms, classification, etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.

39. Pulmonary tuberculosis - secondary forms, classification, etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
40. Heart failure - definition, classification, pathophysiology, types - left-sided, right-sided heart failure, clinical picture, treatment and diagnostic plan, diagnosis.
41. Cardiogenic shock - etiology, pathogenesis, hemodynamic disorders, clinical picture.
42. Endocardial diseases - acute endocarditis.
43. Endocardial diseases - subacute endocarditis.
44. Myocarditis.
45. Mycardiopathies.
46. Pericarditis - acute and chronic - etiology, pathogenesis, pathomorphology, clinical picture, treatment and diagnostic plan, diagnosis.
47. Rheumatism - etiology, pathogenesis, pathomorphology, clinical picture, clinical forms, treatment and diagnostic plan, diagnosis.
48. Mitral regurgitation - etiology, pathophysiology, clinical picture, treatment-diagnostic plan, diagnosis.
49. Mitral stenosis - etiology, pathophysiology, clinical picture, treatment-diagnostic plan, diagnosis.
50. Aortic regurgitation - etiology, pathophysiology, clinical picture, treatment-diagnostic plan, diagnosis.
51. Aortic stenosis - etiology, pathophysiology, clinical picture, treatment and diagnostic plan, diagnosis.
52. Hypertensive disease - etiology, pathogenesis, clinical picture, complications, treatment and diagnostic plan, diagnosis.
53. Ischemic heart disease. Stable and unstable angina - etiology, pathogenesis, clinical picture, forms, diagnosis.
54. Ischemic heart disease - myocardial infarction - etiology, pathogenesis, pathomorphology, forms, clinical picture.
55. Acute renal failure - etiology, pathogenesis, clinical picture.
56. Chronic renal failure - etiology, pathogenesis, clinical picture.
57. Acute diffuse glomerulonephritis - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
58. Chronic glomerulonephritis - classification, etiology, pathogenesis pathomorphology, forms, clinical picture.
59. Nephrolithiasis.
60. Renal crisis.
61. Acute and chronic pyelonephritis - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
62. Gastroesophageal reflux disease /GERD/. Reflux esophagitis - etiology, pathogenesis, clinical picture.

63. Acute and chronic gastritis - etiology, pathogenesis, pathomorphology forms, clinical picture, diagnosis.
64. Ulcer disease - duodenal and gastric - etiology, pathogenesis, pathomorphology, clinical picture, forms, complications, diagnosis.
65. Stomach cancer - etiology, pathogenesis, pathomorphology, clinical picture, forms, diagnosis.
66. Acute and chronic enteritis. Gluten enteropathy - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
67. Chronic ulcerative-hemorrhagic colitis and Crohn's disease - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
68. Colon cancer.
69. Irritable bowel syndrome - etiology, pathogenesis, clinical picture, diagnosis.
70. Acute viral hepatitis - etiology, pathogenesis, pathomorphology
71. Chronic hepatitis B.
72. Chronic hepatitis C.
73. Liver cirrhosis - portal hypertension and ascites.
74. Liver cirrhosis - hepatic encephalopathy and hepatic coma.
75. Primary liver cancer - pathomorphology, clinical picture, diagnosis.
76. Cholelithiasis - choledocholithiasis (biliary crisis).
77. Jaundice - types, differential diagnosis.
78. Acute and chronic cholecystitis - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
79. Acute pancreatitis - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
80. Chronic pancreatitis - etiology, pathogenesis, pathomorphology, clinical picture, diagnosis.
81. Pancreatic cancer - clinical picture, diagnosis.
82. Iron deficiency anemia - classification, etiology, pathogenesis, clinical picture, diagnosis.
83. Vitamin B-12 and folate deficiency megaloblastic anemia - etiology, pathogenesis, clinical picture, diagnosis.
84. Acute leukemia - classification, etiology, pathogenesis, clinical picture, hematological forms, diagnosis.
85. Chronic myelogenous leukemia - etiology, pathogenesis, clinical picture, hematological picture, diagnosis.
86. Chronic lymphocytic leukemia - etiology, pathogenesis, clinical and hematological picture, diagnosis.
87. Plasmacytoma - etiology, pathogenesis, clinical and hematological picture, diagnosis.
88. Essential thrombocytopenia - Myeloproliferative diseases.
89. Hyperthyroidism. Graves' disease - etiology, pathogenesis, clinical picture, diagnosis.

90. Hypothyroidism /Myxedema/ - etiology, pathogenesis, clinical picture, diagnosis.
91. Hypocorticism /Addison's disease/ - etiology, pathogenesis, clinical picture, diagnosis.
92. Cushing's syndrome and disease - etiology, pathogenesis, clinical picture, diagnosis.
93. Diabetes mellitus - complications.
94. Gout - etiology, pathogenesis, clinical picture, diagnosis.
95. Rheumatoid arthritis - etiology, pathogenesis, clinical picture, diagnosis.
96. Ankylosing spondylitis /Bechterew's disease/ - etiology, pathogenesis, clinical picture, diagnosis.
97. Deforming arthrosis - etiology, pathogenesis, clinical picture, diagnosis.

Part IV - basic laboratory tests

98. General properties of urine. Specific gravity. Zimnitsky's test and Folhard's test.
Clinical significance.
99. Protein in urine. Method for qualitative detection and quantitative determination. Types of proteinuria. Clinical significance.
100. Sugar in urine. Methods for qualitative detection and quantitative determination. Clinical significance.
101. Ketone bodies in urine. Methods of examination. Clinical significance. Blood in urine - methods of examination. Clinical significance.
102. Bile pigments in urine. Methods of examination. Clinical significance.
103. Urine sediment. Quantitative determination of formed elements. Clinical significance.
104. Hemoglobin - methods of determination, reference limits, clinical significance.
105. Hematocrit - methods of determination, reference limits, clinical significance.
106. Erythrocyte count. Methods of counting. Reference limits. Clinical significance. Mathematical indicators - clinical significance.
107. Leukocyte count. Methods of counting. Reference limits. Clinical significance.
108. Platelet count. Counting methods. Reference limits. Clinical significance.
109. Erythrocyte sedimentation rate. Westergreen method and Panchenko method. Reference limits. Clinical significance.
110. Blood smear. Erythrocyte morphology. Clinical significance.
111. Differential blood count. Clinical significance. Pathological differential blood counts.
112. Myelogram. Morphology of cells of the erythroblastic order.
113. Myelogram. Morphology of cells of the granulocyte order.
114. Myelogram. Morphology of monocytes, lymphocytes and plasma cells.
115. Myelogram. Morphology of cells of the megakaryocyte order.

REFERENCES

Textbook:

1. Propaedeutics of Internal Diseases, volume 1, CMB, 2021
2. Propaedeutics of Internal Diseases, P.Solakov and St.Kuzmanova, Med. ed. "Raykov", Plovdiv, 2000
3. Propaedeutics of Internal Diseases, ed. Ch. Nachev, Sofia, 1997
4. Harrison's Principles of Internal Medicine, 21 ed.
5. Hutchinson's Clinic methods, M. Swash, WS Saunders, London, 1999.
6. Davidson's Principles and Practice of Medicine, C Livingstone, 1999

Compiled by:
(D-r Mariana Yoncheva-Mihaylova, PhD)

Approved by a decision of the Council of the Department of INTERNAL DISEASES, SOCIAL MEDICINE, PHYSIOTHERAPY AND REHABILITATION, DISASTER MEDICINE, Protocol № 4...02.07.2025

Head of department:
(Prof. Vladimir Gonchev, PhD)

Approved by a decision of the Faculty Council of the Medical Faculty, Protocol № 26/09.07.2025

Secretary of the Council of the Medical Faculty:
(Chief Assist. Prof. Ruska Nenkova, PhD)

BURGAS STATE UNIVERSITY „PROF. DR. ASSEN ZLATAROV”
FACULTY OF MEDICINE
Department of Physics, Biophysics, Roentgenology and
Radiology;

Approved by:

DEAN:

Prof. Romyana Yankova, PhD



SYLLABUS

Study discipline:	ROENTGENOLOGY AND RADIOLOGY
Specialty:	MEDICINE
Professional field:	7.1. Medicine
Educational and qualification degree:	MASTER
Form of training:	REGULAR

BURGAS, 2026

EXTRACTS FROM THE CURRICULUM

1. GENERAL PARAMETERS OF THE DISCIPLINE							
Total /academic hours/:		180		ECTS:		6	
Auditorium classes		Non-auditorium classes		Auditorium ECTS		Non-auditorium ECTS	
105		75		3.5		2.5	
Type of discipline:		Academic hours per week / lectures and practical lessons/		Course:		Semester:	
Mandatory		1 + 2 / 2+2		III и IV		VI и VII	
2. STUDY FORMS							
Auditorium classes		Academic hours	ECTS	Auditorium ECTS	Academic hours	ECTS	
Lectures		45	1.5	Consultation	20	0.7	
Practical lessons		60	2.0	Individual work - Preparation for practical lessons - Exam preparation	20	0.7	
					10	0.3	
					25	0.8	
3. EVALUATION AND CONTROL							
Forms of evaluation and control					Relative share in the total score		
Session evaluation (exam)					0.4		
Semester (ongoing) assessment					0.6		
Forms of semester control							
- Attendance at lectures and practical classes					0.25		
- regular examination during the practical lessons					0.25		
- Active participation in the practical lessons					0.25		
- Preparation of presentations					0.25		

ANOTATION

Of the study discipline

„Roentgenology and radiology”

Purpose of the study discipline

The study discipline "Roentgenology and radiology" is intended for students of the specialty "Medicine" at the Faculty of Medicine, a regular form of education, graduating with the educational and qualification degree "Master" and the professional qualification "Doctor". Discipline is mandatory according to the Uniform State Requirements.

The **aim** of the training in "Roentgenology and radiology" is to form physicians with broad knowledge of modern imaging methods, their informative value and the imaging symptomatology of the various nosological units in accordance with the medical standards and international requirements of the discipline, as well as the specific characteristics of the work process in structures of radiology, nuclear medicine and radiotherapy.

Structure of learning content

The study discipline includes studying the nature and properties of X-rays, ultrasound waves and magnetic resonance imaging ; the imaging methods of the respiratory, cardiovascular, digestive, urinary, musculoskeletal system of the CNS; the image characteristic of congenital and acquired; inflammatory, neoplastic, traumatic diseases, emergency conditions, etc., as well as invasive and interventional procedures.

Main tasks of the curriculum:

To familiarize medical students with:

- ☐ the indications for reporting imaging studies in the different nosological entities;
- ☐ the preparation of patients for diagnostic imaging modalities
- ☐ the system for interpreting images from different methods
- ☐ the algorithms for conducting and contraindications for imaging methods
- ☐ the principles of safe work and the rules for radiation protection in X-ray examinations
- ☐ the essence, advantages, disadvantages and clinical application of the basic x-ray research methods, as well as other non-x-ray imaging diagnostic methods
- ☐ imaging findings in the most common diseases by systems;
- ☐ the principles of preparation and approach in applying the methods in nuclear medicine and radiation therapy.
- ☐ The principles of implementation, indications and contraindications for the various methods in nuclear medicine and radiation therapy

Teaching methods:

traditional and innovative teaching methods, lectures, practical lessons, discussions, seminars, presentations, teamwork, etc.

Expected results:

After completing the study course in Roentgenology and Radiology, students must have the following theoretical knowledge:

-the nature and properties of X-rays, the principles of X-ray equipment and obtaining an X-ray image, the nature and properties of ultrasound and magnetic resonance imaging and the principles of obtaining images;

☐ the basics of radiation protection, working with contrast agents, preparing patients for various imaging studies

☐ research methods and visual findings, semiotics of diseases by systems: respiratory, cardiovascular, digestive, urinary, etc.;

☐ basic knowledge of the different methods of radioisotope diagnostics and radiotherapy;

☐ indications for X-ray examination by nosological units, preliminary preparation, contraindications for X-ray examination

☐ the main imaging diagnostic research methods: X-ray, ultrasound, magnetic resonance, nuclear diagnostics;

☐ the image-diagnostic symptoms of the most common diseases by organs and systems;

☐ the indications and the main invasive and interventional methods in radiology

☐ the principles of preparation and approach in applying the methods in radiotherapy and nuclear medicine

Practical skills and knowledge of the study discipline:

☐ filling in a form for ordering of different imaging investigations

- recognition and description of normal anatomical structures in various imaging studies

☐ description and interpretation of conventional X-ray examinations, CT examinations in diseases of the various systems

☐ Preparation of the patient for X-ray and ultrasound examination of the digestive tract.

☐ Preparation of the patient for CT and MRI examinations

☐ imaging methods and practical approaches in emergency cases (pneumothorax, fractures, acute abdomen, hemothorax).

☐ Working with contrast agents in different imaging methods. Principles of preparation in allergic conditions. Rules and conduct.

☐ Knowledge of the basic principles of interventional diagnostics and treatment.

- Knowledge of the essence, principles and clinical use of the main methods in nuclear medicine and radiation therapy
- Preparation of the patient for the basic methods in nuclear medicine and radiation therapy.

Forms of assessment of acquired knowledge

A combination of modern and classical methods is used to assess students' knowledge.

Current control:

- ☐ Oral examination before conducting the practical lesson
- ☐ Tests
- ☐ Seminar classes - discussions
- ☐ Evaluation and verification of the protocols at the end of the exercise
- ☐ Colloquium with test part and oral examination

Semester Exam:

- ☐ Test
- ☐ Practical exam
- ☐ Theoretical exam with a written part kept in the archive of the department and an oral part before a committee of qualified teachers

CURRICULUM CONTENT

LECTURES

TOPICS	Hours
1. Physical basics of X-ray diagnostics. Detection, nature and properties of X-rays. X-ray image - essence, principle of obtaining, quality assurance. Visualization of the X-ray image: - conventional; CR, DR. Methods of X-ray diagnostics: fluoroscopy, radiography - essence, advantages, disadvantages, clinical use. Ultrasound diagnostics - essence, principle of obtaining images, advantages, disadvantages, clinical use. Doppler sonography.	2
2. Multislice imaging methods: Computed tomography; Magnetic resonance tomography - essence, principle of image acquisition, advantages, disadvantages, clinical use. Angiographic examination: conventional angiography, CT angiography; magnetic resonance angiography. Invasive and interventional methods in radiology - X-ray, ultrasound, CT and MR control. Basic concepts in X-ray, CT, MR and US diagnostics.	2
3. Contrast agents in imaging diagnostics. Contrast agents in X-ray diagnostics – nature, types, method of administration, preliminary preparation. Contrast agents in CT, MRI and US diagnostics. Radiation protection – nature and principles. Radiation protection of medical personnel and patients in imaging departments. Dosimetry.	2
4. Diagnostic imaging of respiratory system. Imaging methods . Normal imaging anatomy of the respiratory system. Symptoms of impaired bronchial patency - hypoventilation, atelectasis, etc. Inflammatory diseases of the lungs - nonspecific inflammatory diseases - bronchitis, pneumonia, lung abscess, etc. Diseases of the larynx and trachea. Diseases of the bronchi. Bronchiectasis. Diseases of the pleura – pleural effusions, pneumothorax.	3
5. Diagnostic imaging of pulmonary tuberculosis. Classification. Primary pulmonary tuberculosis. Postprimary pulmonary tuberculosis. Pneumoconioses. Silicosis.	2
6. Lung tumors – benign and malignant, primary (central and peripheral), secondary (metastatic). Parasitic diseases – general characteristics. Hydatid cyst disease – imaging features.	2
7. Diagnostic imaging of the cardiovascular system. Methods of examination. Imaging anatomy of the cardiovascular system. General X-ray symptomatology. Mitral valve diseases. Aortic valve diseases. Myocardial diseases. Pericardial diseases.	2

8. Diagnostic imaging of the cardiovascular system. Imaging methods the large blood vessels. Diseases of the aorta – aneurysms, dissections, etc. Diseases of the peripheral arterial vessels, diseases of the venous vessels, diseases of the lymphatic system.	2
9. Interventional methods of diagnosis and treatment. Endovascular therapy in diseases of the CNS, heart, and peripheral vessels. Embolization techniques in benign and malignant tumors.	2
10. Diagnostic Imaging of digestive system. X-ray imaging methods – noncontrast and contrast ; basic principles, preparation and application. Contrast X-ray examinations of the esophagus, stomach and duodenum, small intestine. Barium swallow, Barium meal, Barium enema. Diseases of the esophagus – diverticula, strictures, inflammatory diseases, tumors.	2
11. Diagnostic imaging of digestive system. Gastric and duodenal ulcers. Stomach tumors – benign and malignant. X-ray diagnostics of the operated stomach. Intestinal diseases – diverticula, polyps, enteritis, Crohn's disease, small intestine tumors, colitis, colonic tumors. Application of CT and MRI in intestinal diseases. Specialized imaging studies – Virtual colonoscopy, CT and MR enterography	2
12. Diagnostic imaging of the liver, gallbladder, pancreas and bile ducts. Methods of examining diseases of the gallbladder, bile ducts, liver and pancreas. Invasive and interventional methods. ERCP. Gallbladder diseases - cholelithiasis, cholecistitis, tumors, functional disorders. Focal diseases of the liver - tumors, cysts, hemangiomas, abscesses, etc. Diffuse diseases of the liver - cirrhosis, steatosis, etc. Diseases of the pancreas - pancreatitis, tumors. Diseases of the spleen.	2
13. Diagnostic imaging of urinary system. Imaging anatomy. Methods of examination. Congenital anomalies of the kidneys, ureters and bladder. Renal stones. Focal diseases of the kidneys - cysts, tumors - benign, malignant. Bladder diseases. Interventional methods in the urinary system	2
14. Diagnostic imaging of musculoskeletal system. Imaging anatomy. Imaging methods. Main pathological processes in the bones. Traumatic injuries of bones and joints: fractures and dislocations. Congenital hip joint dislocation.	2
15. Diagnostic imaging of musculoskeletal system. Inflammatory bone diseases. Osteomyelitis – types – primary, secondary, traumatic; course – acute, chronic, atypical. Bone and joint tuberculosis – TB of the spine, TB of the knee joint, TB of the hip joint. Rheumatoid arthritis. Ankylosing spondylitis.	2
16. Diagnostic imaging of musculoskeletal system. Avascular necroses. Perthes disease. Rickets. Degenerative diseases – of the hip, knee etc. Diseases of the skull and sinuses. Imaging anatomy and diseases – inflammatory, allergic, cysts, tumors etc.	2
17. Diagnostic imaging of musculoskeletal system. Primary bone tumors – benign, malignant. Secondary/metastatic/ bone tumors – osteolytic, osteoplastic, mixed	2

18. Diagnostic imaging in obstetrics and gynecology. Imaging methods. Diseases.	2
19. Diagnostic imaging of the breast. Imaging methods. Diseases.	
20. Diagnostic Imaging in emergency conditions. Diagnostic imaging in emergency non-traumatic conditions and diseases. Diagnostic imaging in trauma. Algorithms for different types of traumatic injuries.	2
21. Nuclear medicine diagnostics. Radioactivity. Basic physical quantities in nuclear medicine. Basic principles of radionuclide diagnostics. Equipment. Radiopharmaceuticals. Nuclear medicine diagnostics of the endocrine system: thyroid gland, iodine uptake test, auxiliary tests, scintigraphy, gamma camera. Nuclear medicine diagnostics of the urinary system: isotope nephrogram, clearances, residual urine, scintigraphies, gamma camera studies. Nuclear medicine diagnostics of the cardiovascular system: perfusion scintigraphy of the myocardium and cardiac cavities. SPECT-CT – indications, organ symptomatology. PET-CT – indications, organ symptomatology.	2
22. Basics of radiotherapy. Essence, types. Indications, contraindications, results, complications. Radiotherapy planning. GAMMA-KNIFE, CYBER-KNIFE – essence, indications, therapeutic effect.	2
Total hours:	45

PRACTICAL LESSONS (SEMINARS) TOPICS

Topic	Hours
1. Introduction to the structure and organization of the workflow in a radiology clinic. Form for scheduling an imaging examination. X-rays – nature and properties, interaction with matter. Obtaining X-ray images. Geometric properties of the X-ray image. Qualities of the X-ray image. Basic structure of an X-ray machine. X-ray tube. Focus – types of focuses. Control table. Cables. Photo lab. X-ray films and digital X-ray images. Foils. Cassettes. Processing of X-ray images	2
2. Basic X-ray imaging methods: fluoroscopy, Radiography, Computed tomography. Ultrasound, MRI, DSA - nature, advantages, disadvantages, clinical use. Contrast imaging studies. Contrast agents - types, classification, patient preparation. Complications. Radiation protection - basic principles. Radiation protection of medical staff and patients.	2

3. Imaging methods in respiratory system - fluoroscopy, radiography. Computed tomography - indications and informative value of the method. Imaging anatomy. General X-ray symptomatology of diseases of the respiratory system. Types of opacities.	2
4. Chest radiography report. Plan for reporting normal X-ray images and pathological findings /localization, structure, size, shape, outlines, relation to the surrounding structures etc/. X-ray diagnostics of bronchial diseases. Bronchitis. Bronchiectasis. Impaired bronchial patency. Types - hypoventilation, atelectasis, etc. Foreign bodies in the bronchi.	2
5. Diagnostic imaging of nonspecific inflammatory diseases of the lungs. Lobar pneumonia. Bronchopneumonia. Staphylococcus pneumonia. Lung abscess.	2
6. Pleural diseases. Pleural effusions – exudative, loculated, etc. Pneumothorax. X-ray diagnostics of specific inflammatory diseases of the lungs. Pulmonary tuberculosis. Main forms of pulmonary tuberculosis.	2
7. Diagnostic imaging of lung tumors. Benign tumors: congenital and acquired. Malignant tumors. Primary – lung cancer /central and peripheral type/. Peripheral type with apex localization – Pancoast-Tobias tumor. Pulmonary metastases.	2
8. Pneumoconioses. Silicosis. X-ray diagnosis of parasitic diseases of the lungs. Echinococcus cysts – radiological features.	2
9. Diagnostic imaging of the cardiovascular system. Ultrasound diagnostics – echocardiography. X-ray methods – fluoroscopy, radiography, cardiac catheterization, coronary angiography, DSA. CT and MRI diagnostics. Imaging anatomy of the cardiovascular system. Changes in the shape and size of the heart. Pulmonary changes in cardiovascular diseases	2
10. Imaging findings in diseases of the cardiovascular system. Cardiovascular diseases - acquired valvular diseases of the mitral and aortic valves, diseases of the myocardium, diseases of the pericardium.	2
11. Imaging findings in diseases of the cardiovascular system. Diseases of the vessels. Pulmonary embolism. Aorta – aneurysms, dissection, atherosclerosis. Peripheral vessels: arteries – atherosclerosis; veins – postthrombophlebitic syndrome. Lymphatic vessels – diseases of the lymphatic tissue, metastatic changes.	2
12. X-ray diagnostics in dentistry - intraoral imaging - Dick's method, special imaging methods - orthopantomography, normal X-ray anatomy of the teeth, basic diseases - periodontitis, odontogenic tumors.	2
13. Imaging diagnostics in obstetrics - in pregnancy, in anomalies. X-ray diagnostics in gynecology. Examination methods - radiography, HSG, CT, MRI, angiography. Sterility.	2
14. Diagnostic imaging of the breast. Methods of examination – mammography, ductography, Ultrasound, Magnetic resonance imaging. Diseases of the breast – mastopathy, cysts, fibroadenoma, breast cancer.	2

15. Colloquium	2
16. Imaging methods for examining of digestive system. Radiography. Contrast X-ray examinations with Barium sulfate – Barium studies of the esophagus, stomach, small intestine, irrigography. Possibilities of CT and MRI, specialized examinations - virtual colonoscopy, CT and MR enterography. Normal imaging anatomy of the esophagus, stomach and duodenum. X-ray findings of diseases of the digestive tract. Changes in the lumen - width, outlines, additional opacities, filling defects. Changes in the mucosal folds.	2
17. Diseases of the esophagus. Congenital diseases. Functional diseases – achalasia, megaesophagus. Organic diseases – varices, stricture, diverticula and tumors. Foreign bodies in the esophagus.	2
18. Gastric ulcer – Imaging symptoms. Direct – ulcer crater, inflammatory shaft, convergence of mucosal folds. Indirect – morphological, deformation of the stomach, organic incision, functional, spastic incision, cardiospasm, pylorospasm, hypersecretion, change in the passage, etc. Complications of gastric ulcer disease – imaging findings. Imaging diagnostics of operated stomach – peptic ulcer, gastroesophageal reflux, conducting loop syndrome, Dumping syndrome, cancer recurrence, etc. Gastric tumors. Benign – polyps, fibromas, schwannomas, etc. Malignant/carcinoma/: exophytic forms – medullary carcinoma; endophytic form – infiltrative carcinoma, mixed forms.	2
19. Normal X-ray anatomy and X-ray methods of examination of the small and large intestines. Intestinal passage. Barium enema. X-ray diagnostics of diseases of the small and large intestines – X-ray symptoms/symptom of “snowflakes”, changes in the width of the lumen, filling defect, additional opacities, changes in the mucosal relief, polymorphic haustric pattern, “string” symptom. Diagnostic informative value of US, CT and MRI in intestinal diseases.	2
20. Inflammatory bowel diseases - colitis, appendicitis, Crohn's disease	2
21. Colonic tumors. Benign – polyps. Malignant – carcinoma. Urgent imaging of the digestive system.	2
22. Imaging diagnostics of diseases of the gallbladder, bile duct, liver and pancreas. Imaging methods - ultrasound, CT, MRI, ERCP. Diseases of the gallbladder and bile ducts - cholecystitis, cholelithiasis, tumors. Liver diseases - focal (tumors, cysts, hemangiomas, abscesses, etc.) and diffuse (cirrhosis, steatosis, etc.). Diseases of the pancreas - pancreatitis, tumors, etc.	2

23. Diagnostic imaging of the urinary system. Imaging methods of examination – ultrasound, radiography, contrast X-ray methods. CT of kidneys and bladder. MRI. Normal imaging anatomy. Diseases – congenital anomalies; renal stones, hydronephrosis; inflammatory diseases – pyelonephritis, TB of the urinary tract; tumors of the kidneys and bladder.	2
24. Diagnostic imaging of musculoskeletal system. Imaging methods of skeletal examination – radiography, CT, MRI, ultrasound. Osteodensitometry. Normal X-ray anatomy of long, short, flat bone and of a joint. Main pathological processes in the bone system: osteoporosis, osteosclerosis, osteolysis, osteonecrosis, periostosis. Traumatic injuries of bones and joints – fractures, fissures, pathological fractures, distortions and dislocations. Congenital hip dislocation. Hip dysplasia. Aseptic bone necrosis – Perthes' disease, Osgut-Schlatter's disease, Köhler's disease, Freiberg's disease, etc. Rickets.	2
25. Diagnostic imaging of inflammatory bone diseases. Osteomyelitis – acute and chronic form. Atypical forms – panaritium ossale, Brody's abscess, Garre's sclerosing osteomyelitis. Bone and joint tuberculosis. Imaging diagnostics of diseases of the joints and spine – arthritis and arthrosis, ankylosing spondylitis, deforming spondylosis	2
26. Diagnostic imaging of bone tumors. Benign: osteoma, chondroma, osteochondroma, hemangioma, osteoclastoma, solitary bone cyst. Malignant - primary malignant tumors, osteogenic sarcoma, Ewing sarcoma, myeloma; secondary malignant tumors - bone metastases.	2
27. Diagnostic imaging of diseases of the Central and Peripheral nervous system. Skull radiography. CT, MRI, DSG. Cerebral angiography. Cerebrovascular disease, CNS tumors. Posttraumatic cerebral injuries. Diseases of the paranasal cavities. Diseases of the mastoid cells. Diseases of the spinal column.	2
28. Radioactivity. Basic physical quantities in nuclear medicine. Basic principles of radionuclide diagnostics. Equipment. Radiopharmaceuticals. SPECT/CT and PET/CT – essence, basic principles, patient preparation, advantages, disadvantages and clinical use.	2
29. Basic principles of radiotherapy. Percutaneous radiotherapy with high-energy radiation sources. Basic stages in planning and conducting radiotherapy.	2
30. Colloquium	2
Total hours:	60

ROENTGENOLOGY AND RADIOLOGY EXAM
CONSPECTUS (QUESTIONARY)
for medical students

1. Nature and properties of X-rays.
2. Interaction of ionizing rays with matter /penetration, scattering and absorption/.
3. Device of a conventional X-ray system: X-ray tube, high-voltage generator, control table, electron-optical converter.
4. Contrast agents in imaging diagnostics – classification, advantages, disadvantages, application, patient preparation.
5. Conventional X-ray methods – radiography and fluoroscopy. Essence, advantages, disadvantages, clinical use.
6. Ultrasound diagnostics – essence, advantages, disadvantages, clinical use. Doppler sonography.
7. Principle device of a computed tomography system. Obtaining computed tomography images. Essence, advantages, disadvantages and clinical use.
8. Principle of magnetic resonance tomography system. Essence, advantages, disadvantages, clinical use.
9. Radiation protection of personnel in imaging departments. Radiation protection of the patient during imaging studies.
10. Imaging methods for examining the respiratory system - types, essence, disadvantages, clinical use.
11. X-ray anatomy of the respiratory system.
12. Diseases of the bronchi - Bronchitis. Bronchiectasis. Symptoms of impaired bronchial patency - hypoventilation, obstructive emphysema, atelectasis.
13. Nonspecific inflammatory diseases of the lungs. Pneumonia. Lung abscess.
14. Primary pulmonary tuberculosis.
15. Secondary pulmonary tuberculosis.
16. Pleural disease. Pleurisy. Pneumothorax. Hydropneumothorax.
17. Occupational lung diseases. Silicosis.
18. Lung cancer: central and peripheral.
19. Lung metastases. Echinococcal cysts of the lungs.
20. Imaging diagnostics in diseases of the mediastinum.
21. Imaging methods for examining the cardiovascular system - types, essence, advantages, disadvantages, clinical use.
22. X-ray anatomy of the cardiovascular system.
23. Acquired mitral defects. Mitral stenosis. Mitral insufficiency.

24. Acquired aortic defects. Aortic stenosis. Aortic insufficiency.
25. Diseases of the myocardium and pericardium.
26. Diseases of the aorta – aortic aneurysms, aortic dissections. Pulmonary embolism.
27. Imaging methods for examining the digestive system. types, nature, advantages, disadvantages, clinical use.
28. Diverticula of the esophagus. Corrosive esophagitis. Achalasia. Varices of the esophagus. Esophageal cancer.
29. Crohn's disease.
30. Peptic ulcer of the stomach and duodenum. Gastritis.
31. Tumors of the stomach.
32. X-ray diagnostics of acute surgical abdomen. Perforation of a hollow abdominal organ. Impaired intestinal patency.
33. Diverticula of the colon. Colitis.
34. Tumors of the colon. Benign tumors. Colon cancer.
35. Imaging methods for the study of the gallbladder, liver and pancreas.
36. Gallstone disease. Cholecystitis.
37. Focal diseases of the liver. Hepatocellular carcinoma. Liver metastases.
38. Focal diseases of the liver. Hemangioma. Liver cyst. Liver abscess.
39. Diffuse diseases of the liver. Liver cirrhosis. Liver steatosis.
40. Acute and chronic pancreatitis. Pancreatic cancer.
41. Imaging methods for the study of the excretory system. Types, essence, advantages, disadvantages, clinical use.
42. Congenital anomalies of the excretory system. Classification. Types. Imaging symptoms.
43. Inflammatory diseases of the kidneys. Pyelonephritis. Tuberculosis of the urinary system.
44. Kidney stone disease. Hydronephrosis.
45. Kidney tumors.
46. Bladder diseases.
47. Imaging methods of diagnosis of the bone and joint system. Types, essence, advantages, disadvantages, clinical use.
48. Pathological bone processes. Osteoporosis. Osteosclerosis.
49. Pathological bone processes. Osteolysis, Osteonecrosis. Periostosis.
50. Traumatic bone injuries. Fractures and fissures.
51. Traumatic joint injuries. Joint dislocationss. Congenital hip joint dislocation.
52. Osteomyelitis.

53. Rickets.
54. Bone and joint tuberculosis.
55. Main imaging characteristics of benign bone tumors.
56. Benign bone tumors - Osteoma. Chondroma. Osteochondroma.
57. Benign bone tumors - Osteoclastoma. Hemangioma. Bone cyst.
58. Main imaging characteristics of malignant bone tumors.
59. Malignant bone tumors. Osteosarcoma. Ewing's sarcoma. Myeloma. Bone metastases.
60. Avascular necrosis. Perthes' disease.
61. Degenerative diseases of the spine and joints. Spondylosis. Spondyloarthrosis. Osteoarthrosis.
62. Main imaging symptoms in inflammatory diseases of the joints /arthritis/. Ankylosing spondylitis
63. Imaging methods in the central and peripheral nervous system. Types, nature advantages, disadvantages, use.
64. Tumors of the central nervous system.
65. Cerebrovascular diseases of the central nervous system. Types. Imaging symptoms.
66. Posttraumatic hematomas of the CNS - subdural, epidural and intracerebral.
67. Multiple sclerosis.
68. Diseases of the peripheral nervous system. Disc herniations. Tumors of the spinal cord.
69. Diagnostic imaging diagnostics of paranasal cavities.
70. Methods of imaging diagnostics in dental medicine.
71. Diagnostic imaging of the breast. Benign and malignant diseases.
72. Imaging methods in obstetrics and gynecology. Diseases.
73. Basic principles of radiotherapy.
74. Percutaneous radiotherapy with high-energy radiation sources.
75. Basic stages in planning and conducting radiotherapy.
76. Radioactivity. Basic physical quantities in nuclear medicine.
77. Basic principles of radionuclide diagnostics. Equipment. Radiopharmaceuticals
78. SPECT/CT and PET/CT – essence, basic principles, patient preparation, advantages, disadvantages and clinical use.

Textbooks and manuals:

1. Radiology Lecture Course L. Manchev
2. Qureshi Z. The Unofficial Guide to Radiology, 2nd Edition, 2023
3. Clinical Radiology for Medical Students 3rd Edition
by G. M. Roberts, J. P. Hughes, M. D. Hourihan, 1998
4. D. Sutton Radiology and imaging for Medical students, 7th Edition
5. Fred A. Mettler JR. Essentials of Radiology 3rd Edition, Elsevier, 2014
6. Radiopaedia.org
7. <https://radiologyassistant.nl/>
8. <https://www.radiologymasterclass.co.uk/>
9. <https://radiologykey.com/>

Compiled by the curriculum:

(Assoc. Prof. Dr. Lachezar Manchev, MD, PhD)

The curriculum was discussed and adopted at a meeting of the Department of Physics, Biophysics, Roentgenology and Radiology, No. 7

Head of Department

(Assoc. Prof. Dr. Stefka Kasarova)

The curriculum was adopted and discussed at the
Faculty Council of the Faculty of Medicine,
Minutes No. 38 of 09.04.2026.

Secretary of the Faculty Council: ..

(Head of Asst. Prof. Dr. Ruska Nenkova)