*Biopathology and introduction to medical therapy 2 (*ML0364*)*

1. language

English

2. course contents

Indicare i seguenti dati:

Coordinator: Prof. MONTUSCHI PAOLO

Year Course: 2022/2023 (III anno)

Semester: 2nd

UFC: 14

Modules and lecturers:

- CHEMOTHERAPY OF INFECTIOUS DISEASES (ML0394) - 1.9 cfu - ssd BIO/14

  Prof. Cesare Mancuso

- CHEMOTHERAPY OF INFECTIOUS DISEASES PRACTICALS (ML0395) - 0.1 cfu - ssd BIO/14 Prof. Cesare Mancuso: Canale 1 e Canale 2

- CHEMOTHERAPY OF NEOPLASTIC DISEASES (ML0391) - 0.9 cfu - ssd BIO/14

  Prof. Giacomo Pozzoli

- CHEMOTHERAPY OF NEOPLASTIC DISEASES PRACTICALS (ML0392) - 0.1 cfu - ssd BIO/14 Prof. Giacomo Pozzoli

- CLINICAL MICROBIOLOGY (ML0386) - 3 cfu - ssd MED/07

  Prof. Alexander Friedrich, Maurizio Sanguinetti, Giulia De Angelis

- GENERAL PRINCIPLES OF PHARMACOLOGY (ML0390) - 1 cfu - ssd BIO/14

  Prof. Nadia Mores

- INFECTIOUS DISEASES I (ML0387) - 0.9 cfu - ssd MED/17

  Prof. Rita Murri, Katleen De Gaetano Donati

- INFECTIOUS DISEASES I PRACTICALS (ML0388) - 0.1 cfu - ssd MED/17

  Prof. Katleen De Gaetano Donati, Rita Murri

- PATHOLOGY I (ML0384) - 3.84 cfu - ssd MED/08

  Prof. Esther Rossi, Gian Franco Zannoni, Guido Rindi

- PATHOLOGY I PRACTICALS (ML0385) - 0.16 cfu - ssd MED/08

  Prof. Gian Franco Zannoni, Esther Rossi

- PET INFECTIOUS DISEASES: FROM ANIMALS TO HUMANS (ZOONOSES) (ML0389) - 1 cfu - ssd VET/05

  Prof. Luca Busani, Paolo Pasquali

- PHARMACOLOGY OF THE AUTONOMIC AND CENTRAL NERVOUS SYSTEM (ML0393) - 1 cfu - ssd BIO/14

  Prof. Paolo Montuschi

3. bibliography

Pathology I - Pathology I practicals

All are mandatory texts.

1. V. Kumar, A. Abbas J. Aster. Robbins and Cotran pathologic bases of disease, Ninth Edition, Elsevier, 2014. Chapters 16 Head and Neck, 17 GI Tract, 24 Endocrine and 28 CNS.
2. E. Klatt. Robbins and Cortran Atlas of Pathology, Third Edition, Elsevier, 2014. Chapters 6 Head and Neck, 7 GI Tract, 15 Endocrine and 19 CNS.
3. E. Klatt, V. Kumar. Robbins and Cotran, Review of Pathology, Fourth Edition, Elsevier, 2014. Chapters 16 Head and Neck, 17 GI Tract, 24 Endocrine and 28 CNS.

Clinical microbiology

Sherris Medical Microbiology 7th Edition. McGraw Hill, USA, 2018.

Infectious diseases I - Infectious diseases I practicals

Harrison's Principles of Internal Medicine, 20th edition. Part 5: Infectious Diseases

https://www.uptodate.com/contents/table-of-contents/infectious-diseases

Pet infectious diseases: from animals to humans (zoonoses)

Sherris Medical Microbiology 7th Edition. McGraw Hill, USA, 2018.

Centers for Disease Control website: https://www.cdc.gov/onehealth/basics/zoonotic-diseases.html

General principles of pharmacology

The textbook is chosen by the students.

L Brunton, R H Dandan Goodman & Gilman's. The pharmacological basis of therapeutics 14th Edition, 2018, McGraw-Hill Education – Section I: General principles, Chapter 1. Drug invention and the pharmaceutical industry. Chapter 2. Pharmacokinetics: the dynamics of drug absorption, distribution, matabolism, and elimination. Chapter 3. Pharmacodynamics: molecular mechanisms of drug action. Chapter 4. Drug toxicity and poisoning. Chapter 5. Membrane transporters and drug response. Chapter 6. Drug metabolism. Chapter 7. Pharmacogenetics.

B. Katzung Basic and Clinical Pharmacology 14th Edition, 2017, McGraw-Hill Education / Medical – Section I. Chapter 1. Introduction: the nature of drugs and drug development and regulation. Chapter 2. Drug receptors and pharmacodynamics. Chapter 3. Pharmacokinetics and pharmacodynamics: rational dosing and the time course of drug action. Chapter 4. Drug biotransformation. Chapter 5. Pharmacogenomics.

Chemotherapy of neoplastic diseases - Chemotherapy of neoplastic diseases practicals

L.L. Brunton, R. Hilal-Dandan. Goodman & Gilman's Manual of Pharmacology and Therapeutics. Second Edition. McGraw-Hill, USA, 2013. Section VIII. Chapters 60, 61, 62, 63.

Pharmacology of the autonomic and central nervous system

The textbook is chosen by the students.

1. Katzung B.G. Basic and Clinical Pharmacology. 14th Edition, McGraw-Hill, USA, 2018, Section II. Chapter 6. Introduction to autonomic Pharmacology. Chapter 7. Cholinoceptor-activating and cholinesterase-inhibiting drugs. Chapter 8. Cholinoceptor-blocking drugs. Chapter 9. Adrenoceptor agonists and sympathomimetic drugs. Chapter 10. Adrenoceptor antagonist drugs. Section V: Drugs that act in the central nervous system. Chapter 21. Introduction to the Pharmacology of CNS drugs. Chapter 22. Sedative-hypnotic drugs. Chapter 23. The alcohols. Chapter 24. Antiseizure drugs. Chapter 25. General anesthetics. Chapter 26. Local anesthetics. 27. Skeletal muscle relaxants. Chapter 28. Pharmacologic management of Parkinsonism and other movement disorders. Chapter 29. Antipsychotic agents and lithium. Chapter 30. Antidepressant agents. Chapter 31. Opiod agonists and antagonists. Chapter 32. Drugs of abuse.

2. L.L. Brunton, R. Hilal-Dandan, B.C. Knollmann. Goodman and Gilman. The Pharmacological Basis of Therapeutics. 13th Edition, McGraw-Hill, USA, 2018, Section II, Neuropharmacology, Chapter 8. Neurotransmission: the autonomic and somatic motor nervous systems. Chapter 9. Muscarinic receptor agonists and antagonists. Chapter 10. Anticholinesterase agents. Chapter 11. Nicotine and agents acting at the neuromuscular junction and autonomic ganglia. Chapter 12. Adrenergic agonists and antagonists. Chapter 14. Neurotransmission in the central nervous system. Chapter 15. Drug therapy of depression and anxiety disorders. Chapter 16. Pharmacotherapy of psychosis and mania. Chapter 17. Pharmacotherapy of epilepsies. Chapter 18 Treatment of central nervous system degenerative disorders. Chapter 19. Hypnotics and sedatives. Chapter 20. Opioids, analgesia, and pain management. Chapter 21. General anesthetics and therapeutic gases. Chapter 22. Local anesthetics. Chapter 23. Ethanol. Chapter 24. Drug use disorders and addiction.

Chemotherapy of infectious diseases - Chemotherapy of infectious diseases practicals

B.G. Katzung. Basic and Clinical Pharmacology, 14th Edition Section VIII. Chemotherapeutic drugs: introduction. Chapter 43. Beta-lactam and other cell wall and membrane-active antibiotics. Chapter 44. Tetracyclines, macrolides, clindamycin, chloramphenicol, streptogramins, and oxazolidinones. Chapter 45. Aminoglycosides and spectinomycin. Chapter 46. Sulfonamides, trimethoprim and quinolones. Chapter 47. Antimycobacterial drugs. Chapter 48. Antifungal agents. Chapter 49. Antiviral agents. Chapter 51. Clinical use of antimicrobial agents. Chapter 52. Antiprotozoal drugs.

4. learning objectives

The teaching of Biopathology and introduction to medical therapy 2 aims at making students able

to identify structural and morphological pathological changes at microscopic and macroscopic level; understand the principles of diagnostic and clinical microbiology; understand the principles of etiology, pathophysiology, transmission, diagnosis, prevention and control of infectious diseases and diseases or infections that are naturally transmissible from vertebrate animals to humans (zoonoses); know and understand the general principles of pharmacology, including pharmacokinetics, pharmacodynamics, drug interactions, and toxicology; gain knowledge on pharmacotherapies of infectious and neoplastic diseases and drugs acting at the peripheral and central nervous system level. Bridging the the basic and clinical science teaching blocks, particular emphasis will be put on providing, within individual modules, background knowledge which is deemed particularly relevant for a GP's clinical practice and understanding the biological bases of a personalized approach to medicine.

Regarding Dublin descriptors, students are expected to meet the following objectives:

Knowledge and understanding (Dublin descriptor 1): to gain knowledge on the role of Anatomic Pathology in all clinical settings, on procedures and tools for carrying out a macroscopic examination, on pre-analytical and analytical procedures for processing the material; to understand the principles on which the histological and cytological diagnosis is based; to recognize morphological and functional differences between normal and diseased tissues and to understand, from a structural, morphological, functional perspective, the different types of pathological lesions; to understand physiological and pathological mechanisms of host/microbe interactions, the main features of the most clinically relevant infectious syndromes caused by bacteria, viruses, fungi and parasites, with a focus on the molecular determinants of pathogenesis and resistance to host defences; to understand definition and mechanisms of infectious diseases, the main features of the most important infectious syndromes of medical relevance, the pathogenesis and clinical features of septic syndrome, epidemiology and clinical features of healthcare associated infections. to gain knowledge on the basic features of the most important zoonoses, including aspects related to disease diagnosis and surveillance, the transmission of zoonoses from animals to humans and how transmission is influenced by host, vector, environment and infectious agent characteristics; to gain knowledge on prevention and control of zoonoses; to gain knowledge and understanding of the general mechanisms of drug actions, encompassing therapeutic and adverse effects, of the mechanisms of drug absorption, distribution, metabolism and excretion, of the clinical pharmacokinetics, and factors that determine variations in drug efficacy and safety for the optimal use of medicinal products in clinical practice; to understand the mechanisms of action of antineoplastic drugs; to understand the pharmacology and clinical use of the major classes of antineoplastic drugs including their pharmacokinetics, therapeutic indications and adverse effects; to understand the scientific basis of drug interactions and adverse effects; to gain knowledge and understanding of the pharmacology of drugs acting on the peripheral and central nervous system; clinical pharmacological aspects, including daily doses and therapeutic indications, and will be emphasized; to gain knowledge and understanding on pharmacokinetic and pharmacodynamic characteristics, clinical uses, and adverse effects of the main antibacterial, antiviral, antifungal and antimalarial drugs

Applying knowledge and understanding (Dublin descriptor 2):

to interpret data originating from a laboratory of histopathology; to apply principles of diagnostic pathology; to recognize the morphological characteristics of different pathological tissues; to acquire the modern concept of personalized therapy; to enable students to understand and apply the principles of diagnostic and clinical microbiology to specific cases and the principles of diagnosis of sepsis syndrome and healthcare infections; to enable students to recognize situations in which to use careful procedures to avoid spread of

infections caused by multidrug resistant organisms; to enable students to solve problems related to transmission of diseases from animals to humans and propose strategies for prevention and control of zoonoses; to apply the principles of general pharmacology, chemotherapy of neoplastic diseases, chemotherapy of infectious diseases, pharmacology of the autonomic and central nervous system to solve common and relevant problems in medical therapy based on a personalised pharmacotherapeutic approach.

Making judgements (Dublin descriptor 3): to develop an autonomous capacity of judgement in elaborating and linking the information acquired in the various modules in order to apply that to clinical practice. In particular, students will be able to integrate pathological and microbiological findings with clinical manifestations of diseases and to understand the mechanisms underlying signs and symptoms of diseases; identify current gaps in pharmacotherapies and suggest strategies for improving drug development; read critically and interpret the results of clinical trials.

Communication skills (Dublin descriptor 4): to promote students' ability to communicate knowledge and personal judgments tuning language and conceptual complexity to either specialist (teachers, other students) or non-specialist audiences. Students need to show their capacity to elaborate and integrate the information from multiple sources, to express concisely and hierarchically complex concepts, to catch their audience with clear and visually attractive presentations, and to make the content of their communication comprehensible to the specialist and lay public.

Learning skills (Dublin descriptor 5): to help students develop an autonomous and original method of learning and self-learning, also in view of higher tier studies.

5. PREREQUISITES

Course prerequisites include knowledge of anatomy, physiology, molecular and cellular biology, general microbiology, including the main features of bacteria, viruses, fungi and parasites of medical relevance), principles of epidemiology, immunology, general pathology, infectious diseases, infection control bases, pathogenesis and clinical features of sepsis and most frequent healthcare associated infections, general oncology, and clinical medicine.

6. teaching methods

Knowledge and understanding (Dublin descriptor 1): the teaching of Biopathology and introduction to medical therapy 2, divided into Pathology I, Clinical microbiology, Infectious diseases I, Pet infectious diseases: from animals to humans (zoonoses), General principles of pharmacology, Chemotherapy of neoplastic diseases, Pharmacology of the autonomic and central nervous system, and Chemotherapy of infectious diseases modules, is carried out through face to face, student-centred, interactive lectures in which the main programme topics of individual modules are presented by audiovisual tools. Programme topics of individual modules which are not be presented during face to face lectures due to time limitations, but belonging to the core curriculum of a medical student, are identified in the first lecture and made known to students. They will be referred to relevant educational material and guided in the self-learning. In the first lectures, teachers provide detailed information on textbooks and bibliography helpful for gaining basic knowledge and deepening knowledge in the various modules. Face to face lectures are not only meant to transfer of information, highlight basic knowledge required by medical professional training and facilitate learning on textbooks, but also represent a didactic tool which helps student' ability to gain and understand knowledge through continuous (within each lecture) and iterative (in subsequent lectures) interactions with teachers.

Applying knowledge and understanding (Dublin descriptor 2): Examples of knowledge and understanding application to specific problems relevant to individual modules are provided during face to face lectures and practical activities, including how to assess, compare and choose drugs acting on the peripheral or central nervous system or chemotherapeutics based on their pharmacological properties in a personalised pharmacotherapy perspective; how to apply knowledge and understanding of the principles of general pharmacology to optimise pharmacotherapy and guide clinical management decision making; how to use the pharmacological background to solve problems in a hypothetical clinical setting characterised by disease heterogeneity and to read critically and interpret clinical trial outcomes; hands-on practical sessions at microscopy or in the microbiology or pathology laboratory. The student' skills of specific problem solving, relevant to individual modules, are regularly and iteratively verified in subsequent lectures and practical activity sessions. In some cases, students are offered the opportunity of annual internships in research laboratories under the supervision of a PhD student or a senior researcher.

Making judgements (Dublin descriptor 3): in order to facilitate the development of an autonomous assessment ability, students are asked to critically review the currently accepted options to specific research or clinical problem solutions, propose alternative options and discuss their pros and cons in hypothetical clinical cases. In face-to-face lectures and practical activities, based on the question answer method, students are also asked to identify unmet clinical needs and research priority in topics relevant to the different modules and propose possible strategies to fill the gaps.

Communication skills (Dublin descriptor 4):

In face-to-face lectures and practical activities, students are invited to present and discuss hypothetical clinical cases, laboratory, epidemiological and pharmacological case studies, and clinical trials relevant to individual modules under teacher' supervision. This approach is meant to help students develop their communication skills in terms of presenting and discussing specific topics in a convincing way and with the correct terminology, and communicating clearly to both a specialist and non-specialist audience. Particular attention is paid to the top 5 communication skills and how to improve them, that is capacity of listening, straight talking, non-verbal communication, stress management and emotion control which are subjected to self-assessment and assessment by teachers and classmate' audience.

Learning skills (Dublin descriptor 5): During face-to-face lectures and practical activities, students become familiar with consultation of databases and educational material available on the web. In addition to being a helpful teaching aid, these tools and activities are expected to facilitate the capacity of deepening the student knowledge. Through educational paths shared with teachers, students are expected to develop autonomous and original learning and self-learning skills, also in view of higher tier studies.

Should face-to-face educational activities be precluded by Covid-19 emergency, e-learning modes will be activated as per Education Office indications.

7. other informations

Optional course-related learning opportunities are provided in the form of ad hoc seminars (Optional projects), seminar advertisement, and annual internship in research laboratories. Internal students (one or two per laboratory) are introduced to the most common cellular and molecular biology techniques, omics techniques for molecular phenotyping by PhD students or senior researchers. Students are actively involved in basic and clinical research activities, including experimental design, data analysis and interpretation. Annual attendance, certified by the

supervisor, grants 1 CFU.

Continuous feedback is provided to students during classes, at intervals and at the end of each lesson. Teachers are available for consultation by e-mail or in person, at preset office hours or upon appointment.

Students failing the exam may request for remedial tutoring, to be granted at course coordinator's discretion upon consultation with the teaching staff.

8. methods for verifying learning and for evaluation

Methods for verifying learning and for evaluation include:
a) ongoing evaluation tests: interactive face to face teaching with class involvement (open questions, multiple
choice questions, app-based surveys and written self-evaluation tests); passing the ongoing evaluation tests is required for taking the final evaluation test;
b) final evaluation test: written multiple choice evaluation test at the end of the term, covering the whole teaching programme.
Final test is representative of the various modules of the integrated course with numbers of question items proportionate to the respective CFU. Most question items (5 options, one correct answer) are presented in the form of short clinical case studies to assess student' knowledge and understanding (Dublin descriptor 1), their ability to apply them in a possible real-life situation (Dublin descriptor 2), and their critical evaluation and autonomous judgment abilities (Dublin descriptor 3). Student' communication (Dublin descriptor 4) and learning skills (Dublin descriptor 4) are assessed by teachers during face-to-face lectures and practical activities.
The final evaluation test consists of 70 multiple choice questions distributed as follows based on CFU assigned to various modules: Pathology I, 20 questions; Clinical microbiology, 15 questions; Infectious diseases I, 5 questions; Pet infectious diseases: from animals to humans (zoonoses), 5 questions; General principles of pharmacology, 5 questions; Chemotherapy of neoplastic diseases, 5 questions; Pharmacology of the autonomic and central nervous system, 5 questions; Chemotherapy of infectious diseases, 10 questions.
Anticipated duration of the final written test is 70 minutes.
In each final evaluation test, the percentage of correct answers is translated into marks in an 18 (pass mark)-to-31 (maximum mark with laude) scale using a linear scale alignment, with 95% correct answer being set as 31 and 60% as 18 (pass mark) as follows:

Number of correct answers	Score
42	18
43-44	19
45-46	20
47-48	21
49-50	22
51-52	23
53-54	24
55-56	25
57-58	26
59-60	27
61-62	28
63-64	29
65-66	30
67-70	31 (maximum mark cum laude)

To pass the final test, students need to respond correctly to at least half of the questions plus 1 related to each module, no matter what the total number of correct answers in the test. In this calculation, subchapters of the same module are pooled.

Presentation of a short paper on a topic of Chemotherapy of infectious diseases practicals is required to take the final written test. Further details will be provided during lectures.

During exams, any portable electronic devices, including mobile phones, must be switched off and put over the desk inside an envelope given by the course coordinator. Violations are referred to the disciplinary committee.

After exam results are posted, students are requested to communicate the acceptance/refusal of the assigned mark by e-mailing to the course secretariat within the indicated deadline. Before acceptance/refusal students, are allowed to read their corrected questionnaire(s) under strict supervision by the teaching staff.

Should face-to-face educational activities be precluded by Covid-19 emergency, exams will be taken orally using suitable online platforms as per Education Office indications.

9. program

Pathology I

Sub-module A

- Introduction to Surgical/Anatomic pathology; types of investigation/exam including frozen; handling specimens; cyto/histo techniques and molecular pathology.

- Pathology of central nervous system: hypertension; vascular pathology; trauma; inflammation and infection; degenerative disease; neoplasia.

Sub-module B

- Pathology of head and neck: more on cytological techniques; oral pathology (non-neoplastic and neoplastic); salivary gland pathology; pharynx and larynx pathology; thyroid pathology: malformation, goiter, inflammation and neoplasia.

Sub-module C

- Digestive tract pathology: pathology of the esophagus; gastric pathology: polyps and neoplasia; intestine: non neoplastic pathology with specific reference to inflammatory diseases, neoplasia; liver pathology: acute and chronic hepatitis, cholestasis, alcohol related disease, cirrhosis and liver neoplasia, pathology of the transplanted liver; gall bladder and biliary tree pathology; non neoplastic pancreas diseases; neoplasia.

Pathology I practicals

Slides review.

Clinical microbiology

- Pathogenesis and diagnosis of: pneumonia and respiratory tract infections; urogenital tract and sexually transmitted diseases; viral hepatitis; nosocomial and systemic infections; central nervous system infections, gastrointestinal tract and parasitic infections; fungal infections; biofilm-related infections.

- Microbiota.

- Antibiotic-resistance.

- Diagnostic stewardship.

- The role of clinical microbiology in infection control.

- Outbreak management.

Infectious diseases I

- Introduction to infectious diseases.

- Epidemiology of infectious diseases.

- Infection control.

- Healthcare associated infections.

- Sepsis.

- Antimicrobial resistance.

- Immunopathogenesis of HIV infection.

Infectious diseases I practicals

A clinical case of sepsis.

Pet infectious diseases: from animals to humans (zoonoses)

The course overviews the etiology and epidemiology of the most important animal zoonotic diseases, including main Foodborne and waterborne zoonoses, Rabies, Main Vector borne zoonoses, avian influenza, main parasitic zoonoses. The focus of the course will be on:

Etiology and main features of the zoonotic agents

Epidemiology, ecology, role of the animal reservoirs

Risk of exposure, main clinical pictures

Prevention, treatment, control measures

General principles of pharmacology

- Definitions, drug development, benefit/risks ratio, medicinal products, reference documents, SmPC.

- Pharmacokinetics: absorption, distribution, metabolism, and elimination; drug passage across membranes, transporters; routes of administration; bioavailability; bioequivalence; binding to plasma proteins; phase 1 and 2 reactions; first-and zero order kinetics; volume of distribution; clearance; steady state concentration; half-life; maintenance dose; loading dose.

- Pharmacodynamics: mechanisms of drug action; receptors; affinity; efficacy and potency; agonism and antagonism; receptor regulation and desensitization; graded and quantal dose-response curves; ED_{50} and LD_{50}, additivity and synergism

- Factors modifying drug actions

- Drug interactions

- Pharmacogenetics

Chemotherapy of neoplastic diseases

Overview on cancer biology. Principles of Carcinogenesis. Oncogenes and mechanisms of oncogene activation. General principles of anti-cancer chemotherapy - the basis of anti-cancer chemotherapy and the problem of drug resistance in cancer: permanent and temporary resistance; mechanisms of resistance to antineoplastic drugs; pleiotropic resistance: MDR (multi-drug resistance).

Classification of anticancer drugs: the three waves, 1) classic chemotherapeutics (“dirty drugs”), 2) the “silver bullet” paradigm: targeted therapy (“clean” or “smart” drugs), 3) targeting tumor-supportive cellular machinery. Anticancer drugs mechanisms of action, general overview; combination chemotherapy: therapeutic integration and efficacy.

Classification of anticancer agents: cytotoxic agents, hormonal drugs and targeted drugs. Pharmacology of the major classes of anticancer drugs (mechanisms of action, pharmacokinetics, adverse effects, clinical indications).

1) Cytotoxic drugs.

Alkylating agents and platinum coordination complexes: nitrogen mustards; ethyleneimines; alkyl sulfonates; nitrosoureas; triazenes; miscellaneous alkylating drugs; DNA-methylating drugs; platinum coordination complexes.

Antimetabolites: folic acid analogs, purine analogs, pyrimidine analogs.

Natural products: microtubule-damaging agents: vinca alkaloids, taxanes. Estramustine; epipodophyllotoxins. Campothecins. Antibiotics: dactinomycin, anthracyclines and antracenediones. Drugs with various mechanisms of action: bleomycin, mitomycinC; mitotane, trabectedin, enzymes, hydroxyurea, differentiating agents, histone deacetylase inhibitors.

2) Hormones and hormone antagonists.

Corticosteroids. Adrenocortical suppressants. Estrogens and progestins;; Gonadotropin-releasing hormone analogues; hormone antagonists: tamoxifen; androgens and anti-androgens; 5-reductase inhibitors; aromatase inhibitors.

3) Targeted therapy.

The “targeted” therapy: overview and general concepts; the direct and the indirect approaches. Monoclonal antibodies and small molecules; tyrosin kinase inhibitors. Pharmacology of the major classes of targeted anticancer drugs: BCR-ABL kinase inhibitors, epidermal growth factor receptor inhibitors; HER2/NEU inhibitors; angiogenesis inhibitors; immunomodulators; biological response modifiers – monoclonal antibodies; drugs targeting tumor-supportive cellular machinery (e.g,. bortezumib, ixazomib). Drugs related to the “indirect approaches”: toxin immunoconjugates; gemtuzumab ozogamicin; radioimmunoconjugates; ADEPT enzymes.

Chemotherapy of neoplastic diseases practicals

Discussion of selected basic research articles related to recent advances in cancer biology and pharmacology and clinical trials dealing with the most important anticancer drugs.

Pharmacology of the autonomic and central nervous system

- Introduction to pharmacology of the autonomic, somatic motor and central nervous systems.
- Muscarinic receptor agonists and antagonists. Anticholinesterase agents.
- Agents acting at the neuromuscular junction and autonomic ganglia.
- Adrenergic agonists and antagonists.
- Pharmacotherapy of depression and anxiety disorders.
- Pharmacotherapy of psychoses and mania.
- Hypnotics and sedatives.
- General anesthetics.
- Local anesthetics.
- Pharmacotherapy of epilepsies.
- Drugs for Parkinson’s disease.

- Ethanol.

- Drug addiction.

Chemotherapy of infectious diseases

- Antibacterial drugs

- Antiviral drugs

- Antifungal drugs

- Antimalarial drugs

Chemotherapy of infectious diseases practicals

Discussion of selected clinical trials dealing with the most important antimicrobial drugs