

GENERAL INFORMATION		
Course	Pharmacology	
Course coordinator	Prof. Martina Smolić, MD, PhD	
Assistant/Associate	Assoc. Prof. Ines Bilić Ćurčić, MD, PhD Vjera Ninčević, MD, PhD Tea Omanović Kolarić, MD, PhD Nikola Raguž-Lučić, MD, PhD	
Study Programme	Integrated undergraduate and graduate university study of Medicine in German language	
Status of the course	Mandatory	
Year of study, semester	3rd year, 5th semester	
Grading scale and workload	ECTS	13
	Hours (L+S+E)	170 (45+85+40)
COURSE DESCRIPTION		
Course objectives		
<p>The aim of the course is to acquire knowledge about the principles of pharmacodynamics and pharmacokinetics. The student will be able to interpret the mechanisms of action, methods of application, indications, therapeutic effects, side effects and contraindications for certain groups of drugs. The student will also be trained to recognize side effects and interactions and correctly write prescriptions for different forms of medication. Through the lectures, the student will be familiar with the basic concepts of toxicology and the principles of procedures for poisoning and the application of specific antidotes.</p>		
Enrolment requirements and entry competencies		
There are no special requirements for this course except those defined by the curriculum of the entire study program.		
Learning outcomes at the Programme level		
1.1., 1.2., 2.1., 3.1., 3.2., 3.3., 3.5., 4.1., 4.2.		
Learning outcomes (5-10)		
<p>Knowledge</p> <ol style="list-style-type: none"> 1. Describe the basic principles of new drug development 2. Distinguish groups and generic names of drugs <p>Skills</p> <ol style="list-style-type: none"> 1. Understand the general principles of drug action (pharmacodynamics) and the fate of the drug in the body (pharmacokinetics), 2. Understand the mechanisms of action, therapeutic and adverse effects, method of application, indications and contraindications of certain groups of drugs 3. Understand and know the pharmacological properties of drugs that are an illustrative example for a particular pharmacotherapeutic group. 4. To learn how to correctly write prescriptions for different forms of drugs and to use quality sources of pharmacological literature 		

Course content

General principles of Pharmacology. Basic concepts and history of pharmacology. Medicines legislation. Original and generic drugs. Herbal preparations and homeopathy. Mechanism of drug action. Binding of drugs to molecules in the cell. Specificity of medicines. Classification of receptors. Drug-receptor interaction. The fate of the drug in the body. Movement of drug molecules through cellular barriers. Absorption and distribution of drugs. Availability of the drug. Drug metabolism. Biotransformation reactions. Excretion of drugs and their metabolites. Research of new drugs from molecule to drug. Clinical therapeutic trial. Pharmacoepidemiological research. Medication lists. How drugs work. Receptor proteins. Ion channels as sites of drug action. Cellular mechanisms (excitation, contraction, secretion). Regulation of intracellular calcium. Muscle contraction. Autonomic nervous system. Peripheral nervous system. General principles of chemical transmission. Neurochemical transmission (site of drug action). Agonists and antagonists of cholinergic receptors. Effects of drugs on cholinergic transmission. Agonists and antagonists of adrenergic receptors, drugs affecting noradrenergic transmission.

Medicines with an effect on the heart. An overview of the physiology of cardiac activity. Arrhythmias. Antiarrhythmics. Cardioactive glycosides. Antihypertensives. Control of vascular smooth muscle tone. Action of different groups of drugs. Diuretics and RAAS inhibitors. Transport mechanisms. Pharmacology of diuretics and RAAS inhibitors. Calcium channel blockers, vasodilators.

Medicines for the treatment of coagulation disorders and dyslipidemia. Medicines with an important effect on smooth muscles. Histamine. Serotonin. Ergot alkaloids. Vasoactive peptides. Medicines for the treatment of asthma. Pharmacology of the digestive system. Gastric secretion. Ulcer. Bleeding. Vomit. Motility of the digestive system. Medications for chronic bowel disease.

Pharmacology of the central nervous system. Chemical signaling in the nervous system. Target sites of drug action. Amino acid transmitters and other transmitters. Anxiety. Antiepileptics. Mechanism of action of antiepileptic drugs. Antipsychotics and drugs for affective disorders. Pathogenesis of schizophrenia. Classification of antipsychotics. Mechanism of action of antipsychotics. Theories about the origin of depression. Antidepressants. Addictive substances and drug abuse. Psychomotor stimulants. Psychotomimetics. The nature of drug addiction. Ethanol. Cannabis. Pain. Analgesics. Anesthetics. Pain control mechanism. Chemical mediators for signal transmission. Anesthetics. Nonsteroidal anti-inflammatory drugs, antirheumatic drugs. Treatment of chronic pain. Hormones of the hypothalamus, pituitary gland and adrenal glands. Regulation of thyroid function. Medicines used in disorders of the thyroid gland. Bone remodeling. Medicines for disorders of bone metabolism. Medicines with an effect on the reproductive system. Endocrine control of reproduction and drugs affecting it. Contraceptives. Erection disorders. Pancreatic hormones and treatment of diabetes. Tumor biology and drugs for the treatment of neoplasms. Pathogenesis of malignant disease, principles of cytotoxic drugs. Possible new approaches in the therapy of malignant diseases. Antimicrobial drugs and chemotherapy of infectious diseases. Molecular basis of chemotherapy. Resistance to antibacterial drugs. Antibiotics that act on the cell wall and membrane. Tetracyclines. Macrolides. Streptogramins. Oxazolidinones. Aminoglycosides. Sulfonamides. Trimethoprim. Quinolones. Medicines against mycobacteria and fungi. Antimicrobial activity, resistance, pharmacokinetics, clinical application of antimicrobial drugs. Antiviral drugs. Biological drugs. New drugs for the treatment of tumors, inhibitors of kinases and growthfactors.

Mechanism of action, clinical application. Introduction to toxicology. Toxicological terms and definitions. Specific chemical substances. Pesticides. Side effects and drug interactions of clinical importance. Mechanisms of occurrence of side effects. Mechanisms of interactions and clinical consequences.

Mode of teaching	<input checked="" type="checkbox"/> lectures <input checked="" type="checkbox"/> seminars and workshops <input checked="" type="checkbox"/> exercises <input type="checkbox"/> distance education <input type="checkbox"/> field teaching		<input checked="" type="checkbox"/> independent tasks <input checked="" type="checkbox"/> multimedia and network <input type="checkbox"/> laboratory <input type="checkbox"/> mentoring work <input type="checkbox"/> other				
Student obligations							
Students are expected to attend all class sessions, as well as to take all the examinations. However, they are allowed for excused absences, totalling 30% of all classes.							
Monitoring student work							
Attending classes	x	Class activity	x	Seminar work		Experimental work	
Written exam	x	Oral exam	x	Essay		Research	
Project		Continuous knowledge verification		Paper		Practical work	x
Portfolio							
Grading and evaluation of student work during classes and of the final examination							
<p>Lectures: The student is expected to listen attentively to the lecture.</p> <p>Seminars: Students will actively present a part of the seminar during class. The student is expected to prepare the topic of the seminar in advance from the given mandatory literature.</p> <p>Each student will actively present one topic of the seminar, for which he will be evaluated with a maximum of 3 evaluation points. Each student will take the entrance exam, which can earn 0.5 points per exam. Students who are absent from the seminar or fail to pass the corresponding entrance exam are required to pass the same in a make-up exam, but do not receive grade points. All additional colloquia must be passed before taking the partial exam I, II, or III.</p> <p>Exercises: During the exercises, which include experiments on laboratory animals, learning to write prescriptions, and an exercise in the biochemical laboratory where the concentration of medicine in body fluids is measured, students can earn a maximum of 3 evaluation points, based on active participation and demonstrated knowledge. The student is expected to have theoretical knowledge for the assigned topic of the exercise.</p> <p>Evaluation of partial tests I, II and III.</p> <p>Partial test I includes the material of general pharmacology and the autonomic nervous system, partial test II includes the material of pharmacology of the cardiovascular and central nervous system, while partial test III includes the rest of the material of special pharmacology. Partial tests are composed of 40 questions. The minimum criterion for obtaining evaluation points is 55% of correctly solved questions. The points obtained on the partial test are converted into grade points.</p> <p>Oral part of the final exam</p> <p>The final grade represents the sum of the grade points achieved during the class and on the final exam.</p>							
Required reading							
1. Pharmakologie und Toxikologie. Freissmuth M, Offermanns S, Böhm S; 2 edition: 2016.							
Additional reading							

Number of copies of required literature in relation to the number of students currently attending classes in the course

Title	Number of copies	Number of students
Pharmakologie und Toxikologie. Freissmuth M, Offermanns S, Böhm S; 2 edition: 2016.	https://bfdproxy48.bfd-online.de/login.htm?back=http%3a%2f%2fpartner.bfd-online.info.bfdproxy48.bfd-online.de%2fameos%2fbfdAboGateway%3fabold%3d264117	

Course evaluation procedures

Anonymous, quantitative, standardized student survey providing feedback on the course as well as on the work of course coordinators and their assistants/associates is being conducted by the QA Office of the Faculty of medicine Osijek.