

Study programme	MEDICAL STUDIES IN ENGLISH				
Cycle	INTEGRATED	Type	UNIVERSITY		
Track	-	Module	-		
Year of study	3	Semester	VI		
Name of the subject	PHARMACOLOGY	Subject code	MFMSE602		
ECTS	11	Status	OBLIGATORY		
Number of teaching hours		Lectures	Exercises	Seminars	Practice
		50	35	50	0
Teachers	assist. prof. Ivan Merdžo, MD, PhD	18			
	prof. Mladen Boban, MD, PhD	20			
	prof. Ivana Mudnić, MD, PhD	2			
	assist. prof. Antonio Markotić, MD, PhD	8			
	assist. prof. Diana Gujinović, MPharm	2			
	assistant Ivana Matić, MPharm		0	12	
	assistant Dalibor Raspudić, MD		14	14	
	assistant Martina Vukoja, MPharm		17	12	
	assistant Daria Ostojić, MD		4	12	
Goals of the subject	The goals of the Pharmacology course are: -Achieve students' understanding of general pharmacology, which includes: knowledge of the drugs origin, the way the drugs are administered, the metabolism and elimination of drugs, the mechanisms of action of drugs, the factors that alter drugs effects, and the adverse effects of drugs. -Achieve students' understanding of mechanisms of action, indications, clinically significant side effects, and drug interactions of different groups of drugs. -Acquiring knowledge about writing prescriptions (Pharmacography).				
Learning outcomes	Learning outcomes (LO) Student:		Learning outcome code	LO on the level of study programme	
	Describes and explains the ways of drug administration.		IU-MFMSE602-1	IU-MSE11	
	Describes and explains the processes of drug distribution in the body.		IU-MFMSE602-2	IU-MSE2	
	Describes and explains the biotransformation and elimination processes important for the therapeutic as well as harmful effects of drugs.		IU-MFMSE602-3	IU-MSE3	
	Describes and explains the role of the autonomic nervous system in the effects of drugs acting on organ systems. Describes and explains the latest therapeutic options in the treatment of motor disorders (antiepileptics, antiparkinsonian drugs), psychotropic diseases (anxiolytics/sedatives/hypnotics, antidepressants, antipsychotics), and other neurodegenerative diseases.		IU-MFMSE602-4	IU-MSE11	
	Describes and explains the pharmacology of ergot alkaloids, histamine, serotonin, NO and ET.		IU-MFMSE602-5	IU-MSE11	
	Identifies general and local anesthetics, and the method of their administration. Evaluates good and bad properties of analgesics and non-steroidal anti-inflammatory drugs and their application in practical settings. Explains the pharmacology of opioid analgesics and addictive substances (heroin, cannabis, psychostimulants, and ethanol).		IU-MFMSE602-6	IU-MSE11	

	Describes the mechanisms of action, indications, clinically significant side effects and interactions of drugs that act on: cardiovascular, digestive, respiratory and endocrine systems.		IU-MFMSE602-7	IU-MSE11
	Analyzes the mechanism of action and application of antibiotics, antiviral drugs, and other chemotherapeutics.		IU-MFMSE602-8	IU-MSE11
	Describes the use of drugs in special groups of patients (children and the elderly).		IU-MFMSE602-9	IU-MSE11
	Describes and explains writing drug prescriptions.		IU-MFMSE602-10	IU-MSE21
Prerequisites for course enrollment	In accordance with the regulation on integrated studies.			
Contents of the subject	Week/type	Theme		
	Lectures	L1. Introduction, absorption, distribution of drugs L2. Metabolism and drug elimination, pharmacokinetics L3. Drug action mechanisms, pharmacodynamics L4. Pharmacology of ANS, cholinergic drugs L5. Pharmacology of ANS, adrenergic drugs L6. Pharmacology of histamine, serotonin, and ergot alkaloids, NO L7. Anxiolytics, sedatives – hypnotics, antiepileptics L8. Pharmacotherapy of most common neurodegenerative diseases L9. Antipsychotics, antidepressants L10. Opioid analgesics L11. General and local anesthetics L12. Addictive substances (heroin, cannabis, psycho stimulants, alcohol) L13. Drugs for hypertension treatment L14. Vasodilators in angina pectoris treatment L15. Diuretics L16. Drugs for heart failure treatment L17. Drugs for treatment of arrhythmias L18. Drugs for asthma treatment L19. Drugs for coagulation disorders L20. Pancreatic hormones and drugs in diabetes treatment P21. Antimicrobial drugs L22. Drugs for malignant diseases treatment L23. Immunopharmacology L24. Drugs for peptic disease and laxatives L25. Antidiarrhoeal drugs, antiemetics, and inflammatory bowel disease drugs		
	Seminars	S1. New drug discoveries, generic drugs, and pharmacogenomics S2. Drug's final outcome in the organism S3. Actions of drugs, mechanisms of side effects S4. Cholinergic drugs S5. Adrenergic drugs S6. Anxiolytics, antiepileptics, neurodegenerative diseases S7. Antipsychotics, antidepressants S8. Nonsteroidal anti-inflammatory drugs, antirheumatics S9. Pain treatment S10. General and local anesthetics S11. Antihypertensives, drugs in angina pectoris treatment S12. Drugs in cardiac insufficiency treatment S13. Drugs for treatment of arrhythmias S14. Drugs for treatment of dyslipidemias S15. Drugs for treatment of anemias and hematopoietic growth factors S16. Hormones of hypothalamus, pituitary gland, thyroid gland, and osteoporosis S17. Hormones of the adrenal gland cortex and their antagonists		

		S18. Sex hormones and their inhibitors S19. Drugs in diabetes treatment S20. Most important antibiotics S21. Drugs in treatment of fungi, protozoa, and helminths S22. Drugs for viral and TBC infections S23. Application of drugs in children and elderly patients S24. Drug interactions and side effects S25. Pharmacology of the digestive system									
	Exercises	E1. Pharmacokinetics and pharmacodynamics E2. ANS, isolated muscle E3. Psychopharmacology drugs E4. Analgesics E5. Effects of drugs on cardiovascular system E6. Isolated organs as pharmacological models E7. Dose calculations, ways of different drug administration									
Language	English										
E-learning	Classes are conducted in person. If necessary, lectures and seminars can be held in combination (live and online) or completely online via e-learning platforms (Google Meet) up to maximum of 20%.										
Teaching methods	Teaching, interactive and active-experiential.										
Forms of knowledge testing											
Type of pre-exam obligation					Type of exam						
midterm	seminar paper	Essay/report	practical/project assignment	other	written	oral	practical				
Allocation of ECTS points and share in the total grade											
Student obligations		Learning outcome code		Hour load		ECTS share		Grade share			
Attending classes				135		4,5					
Midterm/Written colloquium, pharmacography		IU-MFMSE602-10		15		0,5					
Partial exams/Written exam		IU-MFMSE602-1 IU-MFMSE602-2 IU-MFMSE602-3 IU-MFMSE602-4 IU-MFMSE602-5 IU-MFMSE602-6 IU-MFMSE602-7 IU-MFMSE602-8 IU-MFMSE602-9		90		3		50%			
Oral exam		IU-MFMSE602-1 IU-MFMSE602-2 IU-MFMSE602-3 IU-MFMSE602-4 IU-MFMSE602-5 IU-MFMSE602-6 IU-MFMSE602-7 IU-MFMSE602-8 IU-MFMSE602-9		90		3		50%			
Total				330		11		100%			
How to calculate the final grade											
According to the Study Regulations, the final grade is obtained as follows: 0-54% insufficient (1) 55-66% sufficient (2) 67-78% good (3) 79-90% very good (4) 91-100% excellent (5).											
Literature	Title (title, author, year)	Edition		Language				Type of literature			
		own	other	Cro.	Engl.	other	Multi.	book	article	script	other
Mandatory	Bertram G. Katzung, Susan B. Masters, Anthony J. Trevor: Basic		x	x	x			x			

	and Clinical Pharmacology 2020.										
	V. Bradamante, M. Klarica, M. Šalković-Petrišić: Farmakološki priručnik, Medicinska naklada, Zagreb, 2008.		x	x				x			
Complementary	H.P. Rang, M.M. Dale, J.M. Ritter, P.K. Moore Pharmacology, 2006.		x	x	x			x			
	Study materials from lectures (handouts etc.)		x	x	x						x

Additional information about the subject:

The exam consists of **two partial written exams** that are organized during the Pharmacology class. **Only students who have passed both partial exams can take the oral exam. Students who did not pass a single partial exam during class will have to take the full test on next terms.** Also, to take the final exam in Pharmacology, **the student must pass a written colloquium in Pharmacography** where the skill of writing a doctor's prescription is tested. The colloquium is organized immediately after the Pharmacography round. If the student did not pass Pharmacography at that time, the students can take it during regular outings for the final exam, where a successful result of the colloquium is a prerequisite for taking the Pharmacology exam. **In order to take the final exam, certification of class attendance and fulfillment of other obligations during Pharmacology classes in the ISS system is an obligatory condition.**