Name of the course	Pharmacology				**Code**	
Type of study program Cycle	Integrated university studies, medicine				**Year of study**	3
Credits (ECTS) :	10,0	*Semester*	6		Number of hours per semester (l+e+s)	135 (50+35+50)
Status of the course:	mandatory	*Preconditions:*	Passing of all of the courses from the previous year of study.	*Comparative conditions:*		
Access to course:	3rd year medical students			*Hours of instructions*:		According to schedule
Course teacher:	Associate professor Ivica Brizić, MD, PhD					
Consultations:	Fridays at 1 PM, or by appointment					
E-mail address and phone number:	ibrizic@gmail.com +387 63 319 537					
Associate teachers	1. assistant Ivan Merdžo, MD, PhD 2. professor Mladen Boban, MD, PhD 3. associate professor Ivana Mudnić, MD, PhD					
Consultations:						
E-mail address and phone number:						
The aims of the course:	Aims of this course are to acquire general principles of drug activity (pharmacodynamics) and its final outcome in the organism (pharmacokinetics), to understand mechanisms of drug effects, therapeutic effects and side effects, ways of administration, indications and contraindications of different drug groups, and to determine pharmacological characteristics of representative drugs from different drug groups. Also, aim of this course is for students to demonstrate proper prescription writing for different forms of drugs as well as using high quality pharmacology literature.					
Learning outcomes (general and specific competences):	To describe and explain general principles of drug activity (pharmacodynamics) and drug's outcome in the organism (pharmacokinetics). To identify most important drugs that represent different pharmacotherapeutic groups, and to sort them according to their mechanisms of actions. To describe and explain administration options, major indications, contraindications, and side effects of drugs that are main representatives of their specific groups and subgroups. To explain important drug interactions and correlate them with					

	pharmacodynamic and pharmacokinetic characteristics of the drugs. To explain and describe a novel drug development process. To correctly calculate the dose and write prescriptions for different forms of drugs. To use relevant domestic and international drug databases.			
Course content (Syllabus):	Pharmacology course consists out of 25 lectures, 25 seminars, and 11 exercises. Testing is performed during seminars, exercises, two partial written exams, final written exam, and the oral exam.			
Format of instruction (mark in bold)	Lectures	Exercises	Seminars	Independent assignments
	Consultations	Work with mentor	Field work	Other
	Remarks: Each class begins with lectures, followed by seminars and exercises.			
Student responsibilities	Attending and actively taking part in classes, passing pharmacography exam, two partial exams (or final written exam), and final oral exam. Students will be evaluated by: - level of active participation in seminars and exercises - preparedness for seminars - reading course literature, development of their own critical thinking on the subject matter and expression of that opinion - writing prescriptions			
Screening student work (mark in bold)	Class attendance	Class participations	Seminar essay	Practical training
	Oral exam	Written exam	Continous assesment	Essay

Detailed evaluation within a *European system of points*

STUDENTS RESPONSIBILITIES	**HOURS**	**PROPORTIONS OF ECTS CREDITS**	**PROPORTIONS OF MARK**
Class attendance and participations			
Seminar essay			
Written exam			
Oral exam			

Further clarification:
Conditions to take the Pharmacology exam are regular attendance at classes and passing the

pharmacography test. Pharmacology exam consists of written (test) and oral part. Each of them contributes 50% to the final grade. During the Pharmacology course two partial written tests are done. First partial test consists out of 50 questions, and second partial test consists out of 60 questions. Students that makes total of 69 points on both of the partial tests can take the final oral exam. If student did not meet the 69 point mark on the partial tests, student can take the final written exam that consists out of 110 questions. To take the oral exam students must pass the final written test with minimum of 69 points.

Final written exam grading:
A = 100 - 110 points (5)
B = 90 - 99 points (4)
C = 80 – 89 points (3)
D = 69 - 79 points (2)
F = 0 - 68 points (1)

According to the regulations of the study, final grade is obtained:
A = 91-100% 5
B = 79 to 90% 4
C = 67 to 78% 3
D = 55 to 66% 2
F = 0 to 54% 1

Required literature:	1. Bertram G. Katzung, Susan B. Masters, Anthony J. Trevor (editors): Basic and Clinical Pharmacology, Croatian translation of the 11th edition, Medicinska naklada, Zagreb, 2011. 2. V. Bradamante, M. Klarica, M. Šalković – Petrišić, (ed): Pharmacology Handbook. Medicinska naklada (second edition), Zagreb, 2008.
Optional literature:	1. H.P. Rang, M.M. Dale, J.M. Ritter, P.K. Moore: Pharmacology. Golden marketing - Tehnička knjiga Zagreb 2006.
Additional information about the course	Means of course quality control: Student questionnaire Quality analysis by students and teachers Analysis of student passing rate Office for course quality control report Self-evaluation and out of institutional evaluation (visits by quality control teams)

Annexes: calendar classes

The number of teaching units	TOPICS AND LITERATURE
I. **2 lectures**	Title: Introduction, absorption, distribution of drugs
	Short description:
	Literature:
II. **2 lectures**	Title: Metabolism and drug elimination, pharmacokinetics
	Short description:
	Literature:
III. **2 lectures**	Title: Drug action mechanisms, pharmacodynamics
	Short description:
	Literature:
IV. **2 lectures**	Title: Pharmacology of ANS, cholinergic drugs
	Short description:
	Literature:
V. **2 lectures**	Title: Pharmacology of ANS, adrenergic drugs
	Short description:
	Literature:
VI. **2 lectures**	Title: Pharmacology of histamine, serotonin, and ergot alkaloids, NO
	Short description:
	Literature:
VII. **2 lectures**	Title: Anxiolytics, sedatives – hypnotics, antiepileptics
	Short description:
	Literature:
VIII. **2 lectures**	Title: Pharmacotherapy of most common neurodegenerative diseases
	Short description:
	Literature:
IX. **2 lectures**	Title: Antipsychotics, antidepressants
	Short description:
	Literature:
X. **2 lectures**	Title: Opioid analgesics
	Short description:
	Literature:
XI. **2 lectures**	Title: Addictions (heroin, cannabis, psychostimulants, alcohol)
	Short description :
	Literature:
XII. **2 lectures**	Title: General anesthetics
	Short description:
	Literature:
XIII. **2 lectures**	Title: Drugs for hypertension treatment
	Short description:
	Literature:
XIV. **2 lectures**	Title: Vasodilators in angina pectoris treatment
	Short description:
	Literature:
XV.	Title: Diuretics

2 lectures	Short description:
	Literature:
XVI. **2 lectures**	Title: Drugs for heart failure treatment
	Short description:
	Literature:
XVII. **2 lectures**	Title: Drugs for treatment of arrhythmias
	Short description:
	Literature:
XVIII. **2 lectures**	Title: Drugs for asthma treatment
	Short description:
	Literature:
XIX. **2 lectures**	Title: Drugs for coagulation disorders
	Short description:
	Literature:
XX. **2 lectures**	Title: Pancreatic hormones and drugs in diabetes treatment
	Short description:
	Literature:
XXI. **2 lectures**	Title: Antimicrobic drugs
	Short description:
	Literature:
XXII. **2 lectures**	Title: Drugs for malignant diseases treatment
	Short description:
	Literature:
XXIII. **2 lectures**	Title: Immunopharmacology
	Short description:
	Literature:
XXIV. **2 lectures**	Title: Drugs for peptic disease and laxatives
	Short description:
	Literature:
XXV. **2 lectures**	Title: Antidiarrhoeal drugs, antiemetics, and inflammatory bowel disease drugs
	Short description:
	Literature:
I. **2 seminars**	Title: New drug discoveries, generic drugs, and pharmacogenomics
	Short description:
	Literature:
II. **2 seminars**	Title: Drug’s final outcome in the organism
	Short description:
	Literature:
III. **2 seminars**	Title: Actions of drugs, mechanisms of side effects
	Short description:
	Literature:
IV. **2 seminars**	Title: Cholinergic drugs
	Short description:
	Literature:

V. **2 seminars**	Title: Adrenergic drugs
	Short description:
	Literature:
VI. **2 seminars**	Title: Anxiolytics, antiepileptics, neurodegenerative diseases
	Short description:
	Literature:
VII. **2 seminars**	Title: Antipsychotics, antidepressants
	Short description:
	Literature:
VIII. **2 seminars**	Title: Nonsteroidal anti-inflammatory drugs, antirheumatics
	Short description:
	Literature:
IX. **2 seminars**	Title: Pain treatment
	Short description:
	Literature:
X. **2 seminars**	Title: Local anesthetics
	Short description:
	Literature:
XI. **2 seminars**	Title: Antihypertensives, drugs in angina pectoris treatment
	Short description:
	Literature:
XII. **2 seminars**	Title: Drugs in cardiac insufficiency treatment
	Short description:
	Literature:
XIII. **2 seminars**	Title: Drugs for treatment of hyperlipoproteinemias
	Short description:
	Literature:
XIV. **2 seminars**	Title: Drugs for treatment of arrhythmias
	Short description:
	Literature:
XV. **2 seminars**	Title: Drugs for treatment of anemias and hematopoietic growth factors
	Short description:
	Literature:
XVI. **2 seminars**	Title: Hormones of hypothalamus, pituitary gland, thyroid gland, and osteoporosis
	Short description:
	Literature:
XVII. **2 seminars**	Title: Hormones of the adrenal gland cortex and their antagonists
	Short description:
	Literature:
XVIII. **2 seminars**	Title: Sex hormones and their inhibitors
	Short description:
	Literature:
XIX. **2 seminars**	Title: Drugs in diabetes treatment
	Short description:

	Literature:
XX. **2 seminars**	Title: Most important antibiotics
	Short description:
	Literature:
XXI. **2 seminars**	Title: Drugs in treatment of fungi, protozoa, and helminths
	Short description:
	Literature:
XXII. **2 seminars**	Title: Drugs for viral and TBC infections
	Short description:
	Literature:
XXIII. **2 seminars**	Title: Application of drugs in children and elderly patients
	Short description:
	Literature:
XXIV. **2 seminars**	Title: Drug interactions and side effects
	Short description:
	Literature:
XXV. **2 seminars**	Title: Pharmacology of the digestive system
	Short description:
	Literature:
I. **4 exercises**	Title: Pharmacokinetics and pharmacodynamics
	Short description:
	Literature:
II. **4 exercises**	Title: ANS, isolated muscle
	Short description:
	Literature:
III. **2 exercises**	Title: Psychopharmacology drugs
	Short description:
	Literature:
IV. **2 exercises**	Title: Analgesics
	Short description:
	Literature:
V. **4 exercises**	Title: Effects of drugs on cardiovascular system
	Short description:
	Literature:
VI. **2 exercises**	Title: Isolated organs as pharmacological models
	Short description:
	Literature:
VII. **2 exercises**	Title: Dose calculations, ways of different drug administration
	Short description:
	Literature:
I. **4 pharmacography exercises**	Title: Introduction, magisterial preparations 1
	Short description:
	Literature:
II.	Title: Magisterial preparations 2

4 pharmacography exercises	Short description: Literature:
III. **4 pharmacography exercises**	Title: Galenic preparations and commercially available drugs Short description: Literature:
IV. **3 pharmacography exercises**	Title: Repetition and children doses Short description: Literature: