Attachment No. 3		Course program for the first cycle of studies			
1.	Course title	Pharmacology			
2.	Code	DMMPC2			
3.	Study program	Dentistry - integrated first and second cycle of studies			
4.	Organizer of the study program (unit, i.e., institute, department, division)	University "Ss. Cyril and Methodius" - Skopje. Faculty of Medicine - Skopje, Institute of Preclinical and Clinical Pharmacology			
5.	Degree (first, second, third cycle)	Integrated first and second cycle studies			
6.	Academic year/semester	Year	2	Semester	4
7	Course workload expressed in ECTS credits	5			
8.	Teacher (in case of multiple teachers, designated teacher in charge)	Head of the Department of Pharmacology Prof. Dr. Trajan Balkanov *teaching is performed by all members of the department			
9.	Language in which the curriculum is conducted	English			
10.	Necessary prerequisites for listening and taking the class	Listened to all compulsory subjects from the first year			
11.	Course objectives (competences) and learning outcomes:	The primary objectives of the subject program are: Getting familiar with the subject and tasks of pharmacology; Learning about the pharmacodynamic effects of medication and their mechanisms of action through which they achieve their effects; Learning about pharmacokinetics of medication, absorption, bioavailability, distribution, metabolism, and elimination of medication;			

		Gaining basic knowledge of toxicology and toxicological research, as well as their importance in drug development Studying possible interactions between medication and other forms of interactions; Learning about dosages of medication and types of doses; Optimization and specific individual approach in adjusting the therapy and dosage regimen of medication; Gaining basic knowledge about the safe use of medication, possible side effects, and pharmacovigilance as a key component of the safe use of medication; Gaining basic knowledge of selected groups of medication, with special reference to the importance of medication for the treatment of pain, nausea, vomiting, and treatment of allergic reactions; Introduction to medication intended for the treatment of respiratory, cardiovascular, and neurological diseases. Gaining basic knowledge about medication used for the treatment of diseases of the digestive system, endocrine organs, and musculoskeletal system. Understanding the basic principles of pharmacogenetics Learning about the safety of medication, possible side effects of medication - local and systemic, as well as minimizing the risk from the same. Training students in prescribing medication and the study of pharmaceutical dosage forms
12.	Detailed course content by chapter and units, with the learning outcomes for each chapter	Theoretical teaching - lectures 1. Chapter - General Pharmacology
		Introduction to Pharmacology ..... 1 class
		Pharmacodynamics
		Mechanism of the effect of medication: general principles..... 2 classes
		Cellular mechanisms of the effect of medication 2 classes
		Measurements and methods in pharmacology - bioessays 2 classes
		Pharmacokinetics
		Absorption and bioavailability of medication..... 2 classes
		Distribution of medication..... 1 class
		Metabolism of medication..... 1 class
		Elimination of medication..... 1 class
		Adverse effects of medication and pharmacovigilance..... 2 classes
		Addiction to medication and other substances, and their abuse..... 1 class
		Result of chapter 1: The student learns about the mechanisms of the effects of medication through which they achieve their effects, about their pharmacodynamic effect, possible interactions, their pharmacokinetic characteristics, as well as their potential harmful and toxic effects, and a way to minimize them.
		2. Chapter – Special pharmacology
		Chemical mediators and autonomic nervous system..... 1 class
		Cholinergic and noradrenergic transmission..... 2 classes
		Medication that affect cardiac function..... 2 classes
		Vascular system (vasoconstrictors and vasodilators)..... 2 classes
		Atherosclerosis and Lipoprotein Metabolism..... 1 class
		Medication used in vascular diseases - hemostasis and thrombosis..... 2 classes
		Medication for the treatment of respiratory diseases 2 classes
		Treatment of kidney and urinary tract diseases..... 1 class
		Medication for the treatment of diseases of the gastrointestinal tract..... 1 class
		Medication used for the treatment of diseases of the endocrine system..... 2 classes
		Anti-allergy and anti-inflammatory medication 2 classes
		Pain management ..... 2 classes
		Anxiolytic and hypnotic medication..... 2 classes
		Medication for the treatment of diseases of the central nervous system: antidepressants, antipsychotics, 3 classes

		antiepileptics.....		
		Antimicrobial medication		4 classes
		Result of chapter 2: The student acquires basic knowledge about the medication used for the treatment of the most significant and common diseases in order to independently prescribe appropriate treatment and dosage regimen.		
		Total		45 classes
		Practical teaching - exercises		
		From the first chapter (study of pharmaceutical dosage forms, method of medicine prescription, method of medicine administration, calculation of doses and dosage of medicine, determination of medicine potency, medicine effectiveness, interactive pharmacology, side effects and pharmacovigilance)		8 classes
		From the second chapter (pharmacography: specific prescriptions of medicine for diseases according to organic systems)		7 classes
		Total:		15 classes
13	Interrelation of subjects	Biochemistry, physiology, pathophysiology, internal medicine, pediatrics, infectiology, anesthesia, and sedation		
14.	Detailed description of the teaching and working methods for the subject	Interactive classes (theoretical), work in small groups (exercises), interactive exercises using the Interactiv Clinical Pharmacology software and other forms provided by the ECTS common criteria		
15.	Total Available Time	150 classes		
16.	Forms of teaching activities	16.1.	Lectures - theoretical teaching. Classes	45
		16.2.	Exercises (laboratory, auditorium), seminars, teamwork	15
		16.3.	Practice: classes	
17.	Other forms of activities	17.1.	Project assignments: classes	
		17.2.	Independent assignments: classes	
		17.3.	Home study - assignments	90
18	Signature requirements	Allowed Absence from up to two exercises and presence at 60% of lectures. Active participation (points) Min-Max Theoretical teaching 1.8 – 3.0 Practical teaching 4.2 – 7.0		
19	Method of grading			
	19.1.	Tests: points		General Pharmacology Test Min-Max 12.0 – 20.0 Special pharmacology test Min-Max 12.0 – 20.0 Practical exam of the exercise material) Min-Max 6.0 – 10.0
	19.2.	Seminar work/project, written and oral presentation: points		
	19.3.	Final exam: points *Oral exam (integrative) – questions on the basis of which integrative knowledge in the field of pharmacology is assessed, which is important for understanding the entirety of the subject.		Min-Max 24.0 – 40.0
20	Evaluation criteria (points/grade)		up to 59 points	5 (five) F
			from 60 to 68 points	6 (six) E
			from 69 to 76 points	7 (seven) D
			from 77 to 84 points	8 (eight) C
			from 85 to 92 points	9 (nine) B
			from 93 to 100 points	10 (ten) A
21.	Method of monitoring the quality of teaching	Self-evaluation by students, assistant control during the practical teaching and assessment of the achieved student success, as well as the pass rate of students who have passed the subject		

22.	Literature					
	22.1.	Required literature				
		Ord. number	Author	Title	Publisher	Year
		1.	Department of Pharmacology with Toxicology	Authorized Lectures		
		2.	Rang and Dale: H.P. Rang, M.M. Dale, J.M. Ritter, R.J. Flower	Pharmacology	Akademski pechat	2013
	22.2.	Additional literature				
		Ord. number	Author	Title	Publisher	Year
		1.	Goodman & Gilman: Lawrence Brunton, John Lasso, Kate Parker	The Pharmacological Basis of Therapeutics	Tabernakul	2011
		2.	Varagic V, Milosevic P:	Farmakologija	Elit Medika 23 Izdanie	2012
		3.	Bertram G. Katzung, Marieke Kruidering-Hall and Anthony J. Trevor	Pharmacology, Examination & Board Review, 12th Edition	Mc Graw-Hill Educa-tion, LANGE	2019