

1.	Subject	MEDICAL CHEMISTRY		
2.	Code	OM 123		
3.	Study Program	General Medicine		
4.	Institution (Unit, Institute, Chair, Department)	Ss Cyril and Methodius University, Medical Faculty, Department of Anatomy		
5.	Degree of education (first or second cycle)	Integrated 6-year study		
6.	Study year/semester	First (I) Second (II)	/ Number of credits	7
8.	Responsible teacher	Prof. D-r Marija Krstevska, PhD		
9.	Preconditions	None		
10.	Teaching goals:	<ul style="list-style-type: none"> • The Science of Matter and Chemical Bonds in Molecules • Solutions and Electrolytes • Energy and Kintetics of chemical reaction • Acids and Bases, Redox reaction, pH and Buffers • Structure and Properties of Organic compounds 		

	<ul style="list-style-type: none"> • Biologically important Organic compounds (Carbohydrates, Proteins, Lipids, Nucleic acids)
--	-----------------------------------------------------------------------------------------------------------------------------------------------

11.	<p>Brief content:</p> <p>Theoretical course:</p> <ul style="list-style-type: none"> • Structure of atoms and molecules, Ionic, Covalent bonds, Intermolecular forces • Basic thermochemical laws, Energy of chemical reactions, Chemical kinetics, Rates of chemical reactions, Chemical equilibrium • Solutions, Quantitative Composition of Compounds, Colligative properties, Weak and Strong electrolytes (dissociation) • Oxido-reduction (Redox reactions), Theory of acids and bases, pH, Buffers, Equilibrium in water solutions • Chemistry of pollution, pollution of natural water and air • Chemistry of carbon atom, Alkanes, Alkenes, Alkynes, Aromatic compounds and their derivatives, Halides, Alcohols, Ethers, Ketones, Aldehydes, Carboxylic acids, Nitrogen and Sulfur containing compounds • Structures and functions of carbohydrates, proteins, lipids, nucleic acids. • Chemistry of pollution, pollution of air, natural waters, sea water, purification of contaminated water before returning to the natural environment, getting clean water. <p>Practical lessons:</p> <ul style="list-style-type: none"> • Preparation and examination of colligative properties of solutions, Volumetric analysis in chemistry, Calculation of solution concentration. • Calculation from chemical equations and formula • Nomenclature of more important organic compounds in medicine, reactions of carbohydrates, protein and lipids. 			
12.	<p>Methods of learning:</p> <p>Interactive teaching (theoretic), working in small groups, laboratory exercises (practices), seminar work and another forms of anticipated criteria of CTS</p>			
13.	Total available time:	90classes		
14.	Organization of the course	<p>39 classes - theoretical course,</p> <p>41 practical course, seminars</p> <p>180 classes - home individual learning</p>		
15.	Forms of teaching activities	15.1.	Theoretical course	39 classes
15.2.		Practical course, Seminars	41 classes	
16.	Other forms of activities	16.1.	Practice	
16.2.		Individual tasks		

		16.3.	Individual (home) learning	120 classes
17.	Method of assessment			
17.1	Tests	Two partial tests (written) 1. Partial test 1 - written		min – max 12 – 20 points
		<ul style="list-style-type: none"> • Basic structure of atom, Periodic Table • Types of chemical bonds, Water, Solutions, Colligative properties of solution • Nonelectrolyte and Electrolyte Solutions • Acids and Bases, Solubility of salts • pH, Buffers, Henderson-Hasselbach equation 		
		2. Partial test 2 - written		9 –15points
		<ul style="list-style-type: none"> • Structure, isomerism, reactivity and classification of organic compounds • Thermodynamic, First and Second Law of 		

			thermodynamic <ul style="list-style-type: none"> • Free Gibbs energy • Chemical Kinetic and factors of influence • Chemical equilibrium and factors of influence • Energy of activation, active complex • Catalyse, catalysts, biological catalyst • Oxidation-reduction, Standard potential, flow of electrons <p>3. Practical exam – written 9 – 15 points</p> <p>4. Final exam oral examination 18– 30 points</p> <p>a) Organic chemistry, chemistry of carbon</p> <ul style="list-style-type: none"> • Hydrocarbons (Alkanes, Alkenes, Alkynes) and polyens • Cycloalkanes • Aromatic Hydrocarbons • Heterocyclic Hydrocarbons • Alcohols, Phenols, Ethers • Ketones, Aldehydes, Carboxylic acids, • Nitrogen and Sulfur containing compounds (amines, amides, tiols) • Structures and functions of, proteins, lipids, nucleic acids. 										
	17.2	Seminar paper/project (oral/written presentation)	3 - 5 min – max										
	17.3	Active participation	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">Theoretical course</td> <td style="text-align: right;">min – max 1-3</td> </tr> <tr> <td>Practical course</td> <td style="text-align: right;">10 - 12</td> </tr> </table>	Theoretical course	min – max 1-3	Practical course	10 - 12						
Theoretical course	min – max 1-3												
Practical course	10 - 12												
18.	Grading criteria (points / grade)		<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; text-align: center;">up to 59 points</td> <td style="text-align: right;">5 (five) F</td> </tr> <tr> <td style="text-align: center;">from 60 to 68 points</td> <td style="text-align: right;">6 (six) E</td> </tr> <tr> <td style="text-align: center;">from 69 to 76 points</td> <td style="text-align: right;">7 (seven) D</td> </tr> <tr> <td style="text-align: center;">from 77 to 84 points</td> <td style="text-align: right;">8 (eight) C</td> </tr> <tr> <td style="text-align: center;">from 85 to 92 points</td> <td style="text-align: right;">9 (nine) B</td> </tr> </table>	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
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
19.	Requirement for signature and taking the final exam	<p>The student is required to actively follow all of the planned activities.</p> <p>Conditional criteria for assessment of knowledge: To get signature in index, the student is duty to obtain minimum 10 points of practical lecture (6.0 points of attendance), 3 points of seminar work and 1 point of theoretical attendance, total 14 points.</p> <p>Practical exam start in a session.</p> <p>To approach to the final exam, oral, the student must obtain minimum 60% knowledge of two partial tests and practical exam.</p> <p>The final exam goes in for examination in a examine sessia</p>	
20.	Language of instruction	Macedonian	
21.	Method of monitoring the quality of teaching process	Attendance of students to classes and interactive participation in theoretical and practical lessons.	

22.	Textbooks			
	Mandatory			
	1.	General and Organic Chemistry for medical students	Krstevska Marija, Alabakovska Sonja, Efremova Aaron Snezana, Labudovic Danica, Cekovska Svetlana	Skopje: Medical Faculty 2011
22.1.	2.	Biochemistry	Dzhekova-Stojkova Sloboda, Korneti Petraki, Todorova Bojana, Trajkovska Snezana. 2 nd Ed	Skopje: Medical Faculty 2011

	3.	Script of Medical Chemistry for medical students	Krstevska Marija, Alabakovska Sonja, Efremova Aaron Snezana, Labudovic Danica, Cekovska Svetlana, DzhekovaStojkova Sloboda, Bosilkova Gordana	Skopje: Medical Faculty	2011
	Additional				
22.2.	1.	General, Organic and Biochemistry	Katherine J Denniston, Joseph J Topping, and Robert L Caret	6 th Ed.	2011
	2.	Selected parts of chemistry for the students of Medical School	Zorana Vujovic	Medical Faculty, Belgrade, Serbia	2006
	3.	Organic chemistry	John McMurry	Skopje	2009
	4.				