

FILE DISCIPLINE

1. Program informations

1.1 University	UNIVERSITY OF MEDICINE AND PHARMACY "VICTOR BABEȘ" TIMIȘOARA
1.2 Faculty	FACULTY OF DENTAL MEDICINE
1.3 Department	IV BIOCHEMISTRY AND PHARMACOLOGY
1.4 The study program..... ¹⁾	Bachelor
1.5 The cycle degree program ²⁾	Bachelor
1.6 Specialty	Dental Medicine - English Section

2. Discipline informations

2.1. Discipline name	CHEMISTRY							
2.2 Titulary discipline lecture	Senior lecturer Dr. Georgescu Alina							
2.3 Titulary discipline laboratory	Senior lecturer Dr. Georgescu Alina							
2.4 Year of study	I	2.5 Semester	I	2.6 Evaluation form	Exam	2.7 Discipline statute	Content ³⁾	DF
							Obligativity ³⁾	DI

3. The didactical activities estimated total time (hours/semester)

3.1 The number of hours weekly	4	3.2 lecture:	2	3.3 laboratory:	2
3.4 The total number of hours	56	3.5 lecture:	28	3.6 laboratory:	28
Time distribution					hours
Study after manual, course support, bibliography and notes					28
Additional documentation in the library, on the specialized electronic platformes and on the field					18
Preparing the seminars/ laboratories/ projects, themes, papers, portfolios and essays					14
Tutoring					
Examination (practical exam: 3 hours; final exam: 1 hour)					4
Other activities					
3.7 Total hours for individual study	64				
3.8 Total hours per semester	120				
3.9 Number of credits ⁵⁾	4				

4. Preconditions (if necessary)

4.1 of curriculum	Not the case
4.2 of skills	Not the case

5. Conditions (if necessary)

5.1 for lecture	• Audio-video equipment
5.2 for seminar/laboratory/project	• Reagents, glassware, materials, specific equipments

6. Specific skills accumulated

Professional skills	<p>Knowledge acquired by the student at the lecture:</p> <ul style="list-style-type: none"> • Organization of living matter; the notions of atom, molecule, radioactive element, subatomic particles, quantum numbers, types of orbital, atomic number, mass number, isotope, atomic mass, molecular weight, mole; the laws of chemistry; • The periodic table; the law of periodicity; periodic properties, non-periodic properties, periodicity of physical and chemical properties in groups and periods; hydrogen and oxygen valence of elements in the main groups, element blocks, properties and importance of elements in the periodic table; • Ionic bond, covalent bond, hybridization notion, coordinative bond, complex combinations, metallic bond, physical bonds, aggregation states; • Reaction mechanisms; stoichiometry of chemical reactions; types of reactions; exothermic and endothermic reactions, reversible and irreversible reactions, redox reactions; • Principle I of thermodynamics; Principle II of thermodynamics; Gibbs free energy and entropy, reaction velocity, speed constant, reaction order, molecularity, expression of laws of speed; catalyst, activation energy, catalytic reactions; • Chemical equilibrium; The principle of Le Chatelier; Law of mass action; steady state equilibrium; structure and water properties, acid, base, ionic product of water, pH; buffer solutions; Hendersson-Hasselbalch equation; • Oxidation number notions, general rules for calculating the oxidation number, electric conductivity, activity, oxidizing agent, reducing agent, semireaction, redox couple, measurement of the oxidoreducing potential of a cell, normal hydrogen electrode, standard oxidation potential, dependence of redox potential of concentration and temperature, electromotive force of a galvanic cell and sense of chemical reactions, electromotive force and free energy Gibbs; • Classification of organic compounds, nomenclature, notions of functional groups, structure and configuration, molecular formula, structural formula; equivalent unsaturation, carbon atom types; types of carbon chains, types of isomerism; reaction mechanisms in organic chemistry • Structure, classification, nomenclature and chemical properties of hydrocarbons, polymers (uses in dentistry), alcohols, phenols, amines, carbonyl compounds, carboxylic acids, derivatives, heterocycles • Structure and classification of proteinogenic, non-proteinogenic amino acids and their functional role, physical, optical, chemical, acid-base, isoelectric pH, peptide bond formation; peptide nomenclature; biological peptides • Structure of saccharides, important representatives of monosaccharides, disaccharides, deoximonosaccharides, aminosaccharides, homopolysaccharides, heteropolysaccharides: structure, properties, biological role; • Constituents of lipid compounds: fatty acids, alcohols, simple lipids, acylglycerols, cerides, complex lipids, steroidal compounds: structure, nomenclature, representatives, properties, biological role. <p>Knowledge acquired by the student at the laboratory:</p> <ul style="list-style-type: none"> • Apparatus and glassware used in the chemistry lab; labor protection rules; general working rules; first aid in case of thermal / chemical burns and intoxication; the main physical quantities and their measurement units, multiples and submultiple units; • Weighing operation using the electronic balance; volume measurements with the aid of glass pipette and semiautomatic pipette, graduated cylinder, volumetric flask; density measurements by densimeter; • The concept of solution, the concentration of a solution, how to prepare a given concentration solution; the infusion solution, isotone, hypotone, hypertone, examples, use; calculations related to the administration of infusion solutions; • Acid and base notions, pH and pOH, Henderson-Hasselbalch equation, pH determination methods, acid-base titration; buffer system and buffering capacity, the main buffer systems of the human body, the mode of action of the bicarbonate / carbonic acid system, the preparation of a buffer solution of a certain pH; <ul style="list-style-type: none"> • the characteristics and mode of collecting of the main biological fluids currently used in the clinical laboratory; • The principle, characteristics and uses of separation methods in the clinical laboratory: centrifugation, dialysis, electrophoresis, chromatography, spectrophotometry.
Transversal skills	<ul style="list-style-type: none"> • Preoccupation for professional development by engaging critical thinking skills demonstrated by active participation in the course and laboratory. • Effective use of information sources and communication and assisted training resources (Internet portals, specialized software applications, databases, on-line courses, etc.) both in Romanian and in an international languages; • Ability to work in a team, to interact socially and to carry out their duties with responsibility and professionalism. • Openness to learning and continuous medical education.

7. The objectives of the discipline (based on the specific skills accumulated)

7.1 The general objectives of the discipline	The General Chemistry has as main objective the presentation, explanation and acquiring fundamental concepts of general chemistry (structure of matter, chemical bonds, the thermodynamics and chemical kinetics, chemical equilibrium, electrochemistry), inorganic (properties and importance of the elements of the periodic table of elements) and organic chemistry (isomers, reaction mechanisms, hydrocarbons, polymers, substances with simple functions, the mixed substances).
7.2 The specific objectives of the discipline	From a practical point of view it follows the acquisition of skills by students on the use of equipment and utensils in the chemistry lab, learning of the separation methods (dialysis, chromatography, electrophoresis and centrifugation) and analytical techniques (titration, optical methods, methods electrometrical). The acquired knowledge and skills in this course will provide essential support in understanding and addressing the following curricular materials: biochemistry, molecular biology, biophysics, genetics, physiology, histology, pathophysiology and pharmacology.

8. Discipline content

8.1 Lecture	Didactical methods	No. of hours	Observations
1. The matter structure. Matter and energy. The matter composition. The chemistry laws.	Oral transmission of information: PowerPoint Demonstrations on blackboard Continuous interrelation with students by questions concerning the presented notions Answer to student questions	2	
2. The atom structure. The atomic theory. Atomic number, mass number, isotopes, molecules. Avogadro's number. The mole concept.		2	
3. The periodic system. The periodic properties of the elements. The electrochemical character.		2	
4. Chemical bonds. The ionic and covalent bonds. The coordinative and metallic bonds.		2	
5. Metallic bond. Intermolecular bonds. Aggregation states of matter.		2	
6. Chemical reactions. The main types of chemical reactions. The stoichiometric calculation.		2	
7. The chemical thermodynamics. Thermodynamic magnitudes with applications in chemical reactions. The chemical kinetic. The reaction velocity and the factors that influence it. Reaction order. The catalysis.		2	
8. The chemical equilibrium. Equilibriums in water solutions.		2	
9. Notions of electrochemistry. Oxidation-reduction potential.		2	
10. Organic chemistry. Classifications. Nomenclature. Types of reactions. Isomerism types.		2	
11. Organic chemistry. The main classes of organic compounds.		2	
12. Amino acids. Structure, types, properties. Peptide bond.		2	
13. Carbohydrates. Structure. Classification. Monosaccharides. Monosaccharide derivatives. Disaccharides. Homopolisaccharides and heteropolisaccharides. Glucidic component of proteins.		2	
14. Lipids. Structure. Classification. Fatty acids. Triacylglycerols. Cholesterol. Complex lipids. Lipid components of proteins.		2	
References: 1. K. W. Whitten , R. E. Davis, L. Peck, G. G. Stanley, General chemistry, 10 th ed. Brooks/Cole: Pacific Grove, CA, 2013 2. D.E. Goldberg, Fundamentals_of_Chemistry, 5 th ed., 2007 3. F. McMurry , Chemistry, 4 th ed., 2004 4. Lehninger Principles of Biochemistry, 6 th ed, Nelson DL and Cox MM. Editors, 2013 5. Martin Levine, Topics in Dental Biochemistry, Springer, 2011			
8.2 Laboratory	Didactical methods	No. of hours	Observations
1. Organization of chemistry laboratory. Materials and utensils. General working rules in biochemistry lab. Work protection rules.	Presentation of the theoretical and practical aspects (including PowerPoint) Student questioning about the theoretical and practical notions. Practical	2	
2. Physical quantities and units of measurement		2	
3. Measurements of mass, volume and density		2	
4. Solutions. Percentage and molar concentrations		2	
5. Solutions. Preparation. Dilutions. Physiological serum.		2	
6. Infusion solutions		2	
7. Acids and bases. pH of solutions. pH calculation.		2	
8. Buffering systems. Buffering capacity		2	

9. Biological specimens. Preparation of biological material for testing laboratory analysis. Centrifugation in clinical laboratory	implementation (execution) of the experiments by students. Calculation of the results Discussions and interpretation of the results.	2	
10. Osmotic pressure. Dialysis. Separation using the electrophoresis method		2	
11. Chromatography. Amino acid separation using chromatographic methods		2	
12. Optical methods in clinical laboratory. Spectrophotometry		2	
13. Spectrophotometry. Calibration curve		2	
14. Seminar. Practical test		2	
References: 1. Anghel A., Kaycsa A., Narita D., Samoila C., Chemistry and Biochemistry Practical Works – Applications in Clinic Laboratory for the Medicine Faculties, Ed. EUROSTAMPA, Timisoara, 2009			

9. Corroborating the contents of the discipline with the expectations of representatives of the epistemic communities, professional associations and representative employers in the field of the program

The knowledge of general chemistry and organic chemistry is essential in order to acquire and understand biochemical processes in the oral cavity (changes occurring at the anatomical level are based on molecular and/or ionic modifications) as well as the physical and chemical properties of different dental materials in dental practice.

10. Evaluation

Activity form	10.1 Evaluation criteria	10.2 Evaluation methods	10.3 % from finale mark
10.4 Lecture	The attendance at the course is compulsory, with a maximum absence of 30% accepted. Promoting the practical test is mandatory. Knowledge for 5: Basic knowledge of the studied subject. Knowledge for 10: Solving at least 90% of the questions.	50 tests with multiple choice according to the methodology adopted by the Senate decision number 6/1908/27.02.2013	50%
10.5 Laboratory	The attendance at practical works is mandatory, with a maximum absence of 15% accepted. Knowledge for 5: Student skills regarding the use of instruments and utensils in the chemistry lab, physico-chemical operations to measure mass, volume and density, techniques for separating the components of a mixture, use of the studied analytical methods. Knowledge for 10: Student skills regarding the use of instruments and utensils in the chemistry lab, physico-chemical operations to measure mass, volume and density, acquiring techniques for separating the components of a mixture, using the analytical methods studied, making correlations with course material for the interpretation of the obtained results.	Continuous evaluation of the theoretical knowledge during the semester. Practical test at the end of the semester, consisting in checking the acquired concepts and performing an experiment.	10% 40%
10.6 Minimum performance standard			
Knowledge of the basic notions of general, inorganic and organic chemistry, practical skills regarding the use of utensils and devices in the chemistry laboratory and understanding of the studied analytical techniques.			

Date: 19.10.2018	Lecture holder Senior lecturer Dr. Georgescu Alina	Laboratory holder Senior lecturer Dr. Georgescu Alina
Discipline coordinator Prof. Dr. Anghel Andrei		
The date of endorsement in the department	Head of the department Conf. Dr. Seclăman Edward	