UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze e Tecnologie Biologiche, Chimiche e Farmaceutiche
ACADEMIC YEAR	2023/2024
BACHELOR'S DEGREE (BSC)	ANIMAL PHARMACEUTICALS AND NUTRACEUTICALS
SUBJECT	GENERAL AND INORGANIC CHEMISTRY
TYPE OF EDUCATIONAL ACTIVITY	A
AMBIT	50148-Discipline Chimiche
CODE	01900
SCIENTIFIC SECTOR(S)	CHIM/03
HEAD PROFESSOR(S)	TERENZI ALESSIO Professore Associato Univ. di PALERMO
OTHER PROFESSOR(S)	
CREDITS	6
INDIVIDUAL STUDY (Hrs)	102
COURSE ACTIVITY (Hrs)	48
PROPAEDEUTICAL SUBJECTS	
MUTUALIZATION	
YEAR	1
TERM (SEMESTER)	2° semester
ATTENDANCE	Not mandatory
EVALUATION	Out of 30
TEACHER OFFICE HOURS	**TERENZI ALESSIO** Monday 15:00 17:00 Edificio 17, Studio 0/C5. Contattare il docente via email per concordare l'orario del ricevimento. Wednesday 15:00 17:00 Edificio 17, Studio 0/C5

DOCENTE: Prof. ALESSIO TERENZI

PREREQUISITES	Knowledge required for being admitted to the degree course
LEARNING OUTCOMES	Knowledge and understanding: knowledge of the general principles of modern chemistry in order to understand the phenomena connected with the properties of matter and of its transformation. Applying knowledge and understanding: ability to apply the assimilated concepts in in the context of the pharmaceutical and nutraceutical sciences. Making judgments: ability to evaluate chemical problems concerning pharmaceutical and nutraceutical sciences. Ability to rationalize and predict possible applications of the knowledge acquired. Communication: ability to clearly and unambiguously communicate, even to non expert interlocutors, information, problems and solutions concerning chemistry. Ability to use the specific language of chemistry. Lifelong learning skills: ability to undertake further scientific studies with a higher degree of autonomy.
ASSESSMENT METHODS	The final examination consists of a written test and followed by an oral exam. The written test lasts 2 hours and consists of five stoichiometry exercises and few open theoretical questions. The oral test, not mandatory, consists of an interview on theoretical and practical aspects regarding the topics covered during the course. The final assessment will be made on the basis of the following conditions: a) Sufficient knowledge of the subjects and theories addressed in the course and sufficient explanation ability; sufficient degree of awareness and autonomy in the application of theories to solve chemical problems (rating 18-21); b) Good knowledge of subjects and theories addressed in the course and discrete explanation ability; fair degree of awareness and autonomy in the application of theories to solve chemical problems (rating 22-25); c) Good knowledge of subjects and theories addressed in the course and good explanation ability; good degree of awareness and autonomy in the application of theories to solve chemical problems (rating 26-28); d) Excellent knowledge of subjects and theories addressed in the course and excellent explanation ability; excellent level of awareness and autonomy in the application of theories to solve chemical problems (rating 29-30L).
EDUCATIONAL OBJECTIVES	The course aims at providing an overview of the scientific language and methodology, with particular emphasis on the structure and reactivity of matter and on the role of chemical processes in biological systems. The main training objective is the knowledge of chemical equilibria in aqueous solution, in order to provide the necessary background for understanding biochemical phenomena.
TEACHING METHODS	The course takes place in the second semester and consists of lectures with topics described in the program. An ongoing evaluation, not mandatory, concerns topics covered in the course. Moreover, classroom exercises are performed to simulate the final examination.
SUGGESTED BIBLIOGRAPHY	F. Demartin: Fondamenti di Chimica generale (EdiSES, I Edizione, 2022, ISBN: 9788836230839) Kotz et al., Chimica (EdiSES, ISBN: 9788879599665) Atkins et al., Principi di Chimica (Zanichelli, ISBN: 9788808320971) Engl. Version - Kotz et al, Chemistry & Chemical Reactivity (ISBN: 978-1337399074)

SYLLABUS

Hrs	Frontal teaching
4	Matter: international system of units; physical and chemical properties, extensive and intensive properties; mass, volume and density; pure substances and mixtures; phase, homogeneous and heterogeneous systems; elements and compounds; Atom and subatomic particles; isotopes and atomic weights; atomic mass unit and mole; percent composition, empirical and molecular formulas.
4	Electronic structure of atoms and periodic table of elements. Bohr's atomic model; wave-particle duality; uncertainty principle; hydrogen atomic orbitals; quantum numbers; poly-electron atoms; electron configuration; Aufbau principle: Pauli exclusion principle and Hund's rule; periodicity of physical and chemical properties: atomic and ionic radii, ionization energy, electron affinity; electronegativity.
4	The chemical bond and molecular structure: binding energy; ionic bond; covalent bond; Lewis structures of diatomic and polyatomic molecules; resonance; formal charge; enthalpy and bond length; bond order; polar covalent bond; molecular geometry of ions and molecules according to the VSEPR model; polar molecules; oxidation number. Valence bond theory; hybridization, sigma and pi bonds.
4	Main classes of inorganic compounds: periodic table, periods and groups; formation of molecular and ionic compounds on the basis of the atomic electron configuration; overview of systematic nomenclature: mono- and polyatomic ions, salts, binary compounds with hydrogen and oxygen, hydroxides, oxoacids, acids, anhydrides.
4	Chemical reactions and balanced chemical equations: combustion; chemical reactions in water solution; redox reactions; mass relationships.
2	Thermochemistry: energy and chemical reactions; conservation energy law; heat and work, exothermic and endothermic reactions; internal energy and enthalpy, enthalpy changes in chemical reactions; Hess law, standard enthalpy of formation.

SYLLABUS

Hrs	Frontal teaching
2	Gaseous state: ideal gas law; intermolecular forces and real gases.
2	Liquid state: properties of liquids; evaporation of a liquid and vapor pressure; Boiling and solidification or melting temperature.
4	Solutions and their properties: liquid in liquid and solid in liquid solutions; units of concentration and excercises on dilutions; saturation and solubility; colligative properties of electrolytes and non-electrolytes solutions: vapor pressure lowering, freezing point depression, boiling point elevation, osmotic pressure.
4	Chemical equilibrium: law of mass action; equilibria in homogeneous and heterogeneous systems; Kp and Kc; reaction quotient and equilibrium constant; Le Chatelier's principle and its applications.
6	Equilibria in water solution: acid-base equilibria; Arrhenius, Brønsted-Lowry and Lewis definition of acids and bases; the pH scale; relative strength of acids and bases; acids, bases and salts in aqueous solution; hydrolysis; buffer solutions; acid-base titrations; indicators.
4	Equilibria in water solution: solubility equilibria; heterogeneous equilibria with slightly soluble salts; solubility and solubility product; precipitation and dissolution; common ion effect on solubility; effect of pH and of the formation of complex ions on solubility.
4	Electrochemistry: galvanic and electrolytic Cells; Daniell cell; electrode potential; Nernst equation and electromotive force; standard hydrogen electrode; standard electrode potential; glass electrode; pH meter; concentration cell; electrolysis: Faraday's laws.