



UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali		
ACADEMIC YEAR	2021/2022		
BACHELOR'S DEGREE (BSC)	FORESTRY AND ENVIRONMENTAL SCIENCES		
SUBJECT	ELEMENTS OF GENERAL AND INORGANIC CHEMISTRY		
TYPE OF EDUCATIONAL ACTIVITY	A		
AMBIT	50126-Discipline chimiche		
CODE	18681		
SCIENTIFIC SECTOR(S)	CHIM/03		
HEAD PROFESSOR(S)	SCOPELLITI MICHELANGELO	Ricercatore	Univ. di PALERMO
OTHER PROFESSOR(S)			
CREDITS	8		
INDIVIDUAL STUDY (Hrs)	132		
COURSE ACTIVITY (Hrs)	68		
PROPAEDEUTICAL SUBJECTS			
MUTUALIZATION			
YEAR	1		
TERM (SEMESTER)	2° semester		
ATTENDANCE	Not mandatory		
EVALUATION	Out of 30		
TEACHER OFFICE HOURS	SCOPELLITI MICHELANGELO Wednesday 14:00 17:00 Studio del docente - Edificio 17		

DOCENTE: Prof. MICHELANGELO SCOPELLITI

PREREQUISITES	No special previous knowledge is required.
LEARNING OUTCOMES	* Knowledge and understanding: knowledge of the basic chemistry principles, understanding the discipline own language * Applying knowledge and understanding: ability to understand and to analyze the main physical phenomena and chemical transformations in the surrounding world * Making judgements: ability to evaluate the consequences of the chemical transformations subjected to observation * Communication: ability to describe, with the discipline own language, the chemical phenomenology * Lifelong learning skills: ability to apply chemical principles as a tool to evaluate real life phenomena
ASSESSMENT METHODS	The final test consists of a written part and an oral one. The written test deals with the solution of stoichiometry quizzes, theoretical questions on the nature of the matter, and organic nomenclature; the oral exams is an interview aimed to ascertain the knowledge of the course topics. The written test is graduated in 30/30, attributing equal scores to all the questions. Passing the written part is a requirement to access the oral test, and the obtained score contributes to the final evaluation. For the students who cleared the ongoing test (expected during the course), the written test is limited to stoichiometry and organic nomenclature parts. The results of the ongoing test are used to determine the final score. Grading (up to 30/30 cum laude) is done using the following criteria: a. Chemistry basic concepts knowledge, with a limited ability to an independent application (18-21); b. Good knowledge of the course contents, with fair display ability during the exam (22-25); c. Deep knowledge of theory, readily applicable in the proposed contexts, excellent exposition with proper language (26-29); d. Ability to autonomously deepen the chemistry topics, to correctly and promptly apply such knowledge also on practical applications (30, 30 cum laude).
EDUCATIONAL OBJECTIVES	The aim of the course is to provide the fundamental concepts of general chemistry, with hints of basic inorganic chemistry and organic chemistry. The student will have to know the basic principles of the atomic and molecular structures, chemical bonding, and the laws responsables of chemical reactions.
TEACHING METHODS	The teaching activity evolves through both frontal lessons and numerical exercises in the classroom. Numerical exercises concern examples and/or applications of the theoretical subjects; their goal is to prepare the student to face the exam test. The direct involvement of the student in such practice aims to polish his/her presentation abilities in communicating results and methods. It is also expected to administer an ongoing test about the discussed subjects, up to that moment. A successful ongoing test implies a reduction of the possible arguments of the final test.
SUGGESTED BIBLIOGRAPHY	Si suggerisce l'uso di un testo di stechiometria e di uno di chimica generale. I testi sono consigliati ma non obbligatori. L'edizione è solo consigliata (è possibile cioè usare la versione digitale, o un'edizione successiva a quella indicata) Generale: * D.A. McQuarrie, P.A. Rock, E.B. Gallogly. Chimica Generale (2 ed. italiana o successiva; ISBN 9788808258106) * G. Bandoli, A. Dolmella, G. Natile. Chimica di Base (2 ed. o successiva; ISBN 9788879592659) * H.S. Stoker. Principi di chimica. EdiSES (qualunque edizione; ISBN 9788879593090) * M. Schiavello, L. Palmisano. Elementi di chimica. EdiSES (qualunque edizione; ISBN 9788879594165) Stechiometria: * F. Cacace, M. Schiavello. Stechiometria. Bulzoni Editore (qualunque edizione; ISBN 9788871194813)

SYLLABUS

Hrs	Frontal teaching
4	Course introduction; matter: physical and chemical, extensive and intensive properties; mass, volume, density; international system of units; pure and mixed substances; phase, homogeneous and heterogeneous systems; elemnts and compounds; nuclear atom and subatomic particles; isotopes and atomic masses; atomic mass unit; percentage composition; empyrical and molecular formula.

SYLLABUS

Hrs	Frontal teaching
4	Atomic electron structure and periodic table; Bohr atomic model; wave-particle duality; uncertainty principle; atomic orbitals; quantum numbers; electron configuration; aufbau; Pauli exclusion principle; Hund rule; chemical and physical properties periodicity: atomic radii, ionization energy, electronic affinity, electronegativity.
6	Chemical bond and molecular structure; binding energy; ionic bond; covalent bond; Lewis structures; resonance; formal charge; bond order; molecular geometry: VSEPR and hybridization; molecular polarity; oxidation states.
2	Main classes of inorganic compounds: periodic table, periods, groups; molecule or ion formation as result of electronic configuration; hints of inorganic systematic nomenclature; hydrogen and oxygen binary compounds; hydroxides, binary acids, oxyacids.
4	Main classes of organic compounds; nomenclature rules in organic chemistry; hydrocarbons, alcohols, ethers, aldehydes, ketones; halogenated compounds; carboxylic acids and their derivatives; aromatic compounds.
4	Chemical reactions and their balancing; combustions; solution reactions; redox; quantitative relations.
6	Energy and chemical reactions; conservation of energy; heat and work, endothermic and exothermic reactions; state of matter; gases, ideal gas law; intermolecular forces and real gases; hydrogen bond; liquids: properties, evaporation, vapor pressure; state transitions; phase diagram.
4	Solutions and their properties; concentration units; saturation and solubility; gas-in-liquid solutions: Henry's Law, effect of temperature and pressure on gas solubility; colligative properties.
4	Chemical equilibrium; law of mass action; homogeneous and heterogeneous equilibria; equilibrium constant; Le Chatelier's principle and its applications.
4	Aqueous equilibria; acid-base equilibria; pH; relative acidity; acids, bases and salts in solution; buffer solutions; acid-base titrations; indicators.
4	Solubility equilibria; solubility and solubility constant; precipitation and dissolution; common ion effect; pH effect; complex formation effect.
2	Elements of organic chemistry reactions.
Hrs	Practice
1	Mole; balancing chemical equations.
1	Quantitative aspects of chemical reactions.
1	Lewis structures and chemical bonds, molecular geometry.
1	Ideal gases.
2	Colligative properties.
2	Acid-base equilibria, titrations.
1	Homogeneous and heterogeneous equilibria.
1	Organic nomenclature.
Hrs	Workshops
1	Chemical laboratory. Introduction to safety practices in a chemical laboratory.
1	Laboratory equipment: use and maintenance. Glassware.
3	Acid-base titrations: indicators.
2	Buffer solutions.
3	Precipitation titrations.