UNIVERSITÀ DEGLI STUDI DI PALERMO

DEPARTMENT	Scienze Agrarie, Alimentari e Forestali
ACADEMIC YEAR	2019/2020
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, and organic nomenclature; the oral exams is an interview aimed to ascertain the knowledge of the course topics. Passing the written part is required in order to access the oral test. 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 appliable 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 responsibles 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 involvment 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	(elenco non esaustivo -- non-complete list) * D.A. McQuarrie, P.A. Rock, E.B. Gallogly: Chimica Generale (Zanichelli) * M. Schiavello, L. Palmisano: Elementi di chimica (EdiSES) * G. Bandoli, A. Dolmella, G. Natile: Chimica di Base (EdiSES) * H.S. Stoker: Principi di chimica (EdiSES)

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.
4	Atomic electron structure and periodic table; Bohr atomic model; wavee-particle duality; uncertainty principle; atomic orbitals; quantic numbers; elctron 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 ybridization; 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, aldehides, chetons; alogenated 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.

SYLLABUS

Hrs	Frontal teaching
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
2	Mole, chemical reactions, balancing a chemical reaction
3	Quantitativae aspects of chemical reactions.
2	Lewis structures and chemical bonds, molecular geometry.
2	Ideal gases.
3	Colligative properties
3	Acid-base equilibria, titrations.
3	Homogeneous and heterogeneous equilibria
2	Organic nomenclature.