UNIVERSITÀ DI PAVIA

Anno Accademico 2016/2017

PRINCIPLES OF CHEMISTRY

Enrollment year	2016/2017
Academic year	2016/2017
Regulations	DM270
Academic discipline	CHIM/03 (GENERAL AND INORGANIC CHEMISTRY)
Department	DEPARTMENT OF ELECTRICAL,COMPUTER AND BIOMEDICAL ENGINEERING
Course	BIOENGINEERING
Curriculum	PERCORSO COMUNE
Year of study	1°
Period	1st semester (26/09/2016 - 13/01/2017)
ECTS	3
Lesson hours	23 lesson hours
Language	ITALIAN
Activity type	WRITTEN TEST
Teacher	MALAVASI LORENZO - 3 ECTS
Prerequisites	None
Learning outcomes	This course aims at introducing basic knowledge about living systems and their study by quantitative models. It consists of three teaching modules: Basic Chemistry, Principles of Physiology, Models in Physiology. "Basic Chemistry" will introduce fundamentals of chemistry, in particular those preliminary to "Principles of Physiology", and provide students with appropriate language, formalisms, and tools needed for the study of physiology. Special attention is paid to ions behavior in solutions, redox processes chemistry, and basic stoichiometry. "Principles of Physiology" will provide students with basic knowledge about cell morphology and physiology, and physiology of organs and systems, in particular respiratory, cardio-vascular, and renal system. "Models in Physiology" will introduce principles of the quantitative study of living systems, in particular those described in "Principles of

	Physiology". The student will learn fundamentals of (i) compartmental models of metabolic systems, (ii) electrical models of bio-electric phenomena, and (iii) mechanical models of simple bio-mechanical systems.
Course contents	The module of Basic Chemistry is given during the first semester, that of Models in Phiysiology during the second semester, and that of Principles of Physiology during both semesters. BASIC CHEMISTRY (3 credits) Introduction. Elements, compounds, substances. Atomic, molecular and isotopic mass. Concept of mole. Chemical reactions. The equivalent. Types of reactions. Redox reactions. The oxidation number. Stoichiometry, chemical names. Atomic structure. Hints about quantum mechanics. Atomic models. Atomic orbitals. Electronic configuration of the elements. Periodic table of the elements and periodic properties. The chemical bond. Ionic and covalent bonds. Lattice energy in ionic solids. Bonding energy. Lewis formulas. Hints to VSEPR theory. Gases. Hints to kinetic theory of gases. Properties and laws of ideal and real gases. Liquids. Vapour pressure and temperature. Solutions: properties, composition, concentration values. Raoult's law. Colligative properties. Solids. Hints to structures and features of ionic, covalent, molecular and metallic crystals. Chemical Equilibrium. The concept of dynamic equilibrium. Equilibrium in solutions. Nature of acids and bases. Acids and bases strength. Structure-features correlation in acids. Auto-ionisation in water. pH and its calculation. Buffer solutions. Hydrolysis. Electro-chemistry. Redox potentials. Nernst's law.
Teaching methods	Lectures (hours/year in lecture theatre): 91 Practical class (hours/year in lecture theatre): 0 Practicals / Workshops (hours/year in lecture theatre): 0
Reccomended or required readings	Lecture notes provided by the teachers and made available through the course website (http://lotarionline.unipv.it/moodle/).
Assessment methods	Written exam
Further information	Written exam
Sustainable development goals - Agenda 2030	$lbl_legenda_sviluppo_sostenibile