

" CHEMISTRY" COURSE DESCRIPTION

Leucio Rossi

Programme of "Chemistry" – General Chemistry Course:		
<ul style="list-style-type: none"> • Code: • type of course unit: Compulsory • level of course unit: 1st cycle in Civil and Environmental Engineering • year of study: 1st year; semester: 2nd semester 		
Number of ECTS credits: 9 (workload is 225 hours; 1 credit = 25 hours)		
Teacher: Leucio Rossi		
1	Course objectives	<ul style="list-style-type: none"> ▪ Describe the nature of matter and atomic theory and its relevance; ▪ Apply proper nomenclature and formulas in writing balanced reactions and solve stoichiometric problems; ▪ Qualitatively and quantitatively describe and predict the reactions of chemicals, and perform thermochemistry analyses of these reactions; ▪ Describe and analyze the behavior of gases, and apply the laws that govern these behaviors in problem-solving; ▪ Explain and interpret the periodic trends of elements and electron configuration; ▪ Predict and formulate the bonding of atoms and molecular geometry of compounds; ▪ State the characteristics of liquids and solids, including phase diagrams; ▪ Identify the characteristics of acids, bases, and salts, and solve problems based on their quantitative relationships; ▪ Determine the rate of a reaction and its dependence on concentration, time, and temperature; ▪ Apply the principles of equilibrium to aqueous systems using LeChatelier's Principle to predict the effects of concentration, pressure, and temperature changes on equilibrium mixtures; ▪ Analyze and perform calculations with the thermodynamic functions, enthalpy, entropy, and free energy; ▪ Discuss the construction and operation of galvanic and electrolytic electrochemical cells, and determine standard and nonstandard cell potentials.
2	Course content and Learning outcomes (Dublin descriptors)	<p>Topics of the module include:</p> <ul style="list-style-type: none"> ▪ Element and compounds; ▪ Atomic Structure and Periodic System; ▪ Chemical bonding and molecular structure; ▪ Gases, liquids, solids and solutions; ▪ Chemical equilibrium; ▪ Phase diagrams; ▪ Acid-base concepts; ▪ Thermodynamics; ▪ Kinetics; ▪ Electrochemistry; <p>On successful completion of this module, the student should:</p> <ul style="list-style-type: none"> ▪ Build a good foundation in chemical knowledge; ▪ Understand the basic structures of atoms, ions, and molecules, and ways to quantitatively describe the properties of atoms and molecules in the various phases of pure matter and in mixtures; ▪ Understand the reactivity of atoms, ions, and molecules, and the various qualitative and quantitative methods for describing or depicting chemical reactions. ▪ Understand the relationship between the electron configurations of atoms and molecules and their chemical properties ▪ Understand the concept of chemical equilibrium, and the energies that drive chemical reactions; ▪ The concept of chemical kinetics and the energy required to initiate a chemical reaction; ▪ Understand the basic principles of electrochemistry such as half reactions, voltaic

		and electrolytic cells
3	Prerequisites and learning activities	The student must know the basic concepts covered in high school chemistry courses and some ability to set up and manipulate algebraic equations
4	Teaching methods and language	Lectures and exercises Language: Italian Ref. Text books * Chimica. Un approccio molecolare – N. Tro – EdiSES (2012); * Fondamenti di Chimica – M. Schiavello; L. Palmisano – EdiSES (2013); * Problemi di Chimica Generale – P. Silvestroni; F. Rallo. - CEA (1996)
5	Assessment methods and criteria	Written and Oral exam