

General Information	
Academic subject	Chemistry
Degree course	Bachelor programme: Food Science and Technology
ECTS credits	9 ECTS
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	<b>Maria Pizzigallo</b>	<a href="mailto:maria.pizzigallo@uniba.it">maria.pizzigallo@uniba.it</a>	AGR/13

ECTS credits details	
Basic teaching activities	6 ECTS Lectures   3 ECTS Laboratory classes

Class schedule	
Period	I semester
Course year	First
Type of class	Lecture- workshops

Time management	
Hours	225
In-class study hours	90
Out-of-class study hours	135

Academic calendar	
Class begins	October 7 <sup>th</sup> , 2019
Class ends	January 24 <sup>th</sup> , 2020

Syllabus	
Prerequisites/requirements	Knowledge of base mathematics and physics
Expected learning outcomes	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ The basic knowledge of atoms and molecules structure and of chemical and physico-chemical laws ruling transformation processes of materials in inorganic and organic field</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Capacity to utilize basic chemistry notions to understand phenomena related to transformation and conservation of food</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Awareness and autonomy of judgment to use the knowledge in the subsequent courses</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Ability to describe the constituents of matter and chemical phenomena related</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Ability to deepen and update the knowledge about the chemical-physical and chemical processes</li> </ul> <p>The expected learning outcomes, in terms of both knowledge and skills, are provided in Annex A of the Academic Regulations of the Degree in Food Science and Technology (expressed through the European Descriptors of the qualification)</p>
Contents	General atomic architecture. Electronic structure of atoms. Atomic models: Bohr and wave-mechanical models. Orbital symbolism. Periodic table and periodic properties. Atomic sizes. Ionization energy, electron affinity and electronegativity. Atomic weight and related quantities. Formula and molecular weight. Avogadro

	<p>number and mole concept.</p> <p>Chemical bonding: electrovalent, covalent and donor-acceptor covalent bonding. Lewis, VB and MO theory. Hybridization. Molecular orbitals. The structure of molecules. Dipole bonding and van der Waals Forces. Hydrogen bond.</p> <p>Chemical formulas and equations. Stoichiometry. Weight relations in chemical equations. Oxidation-Reduction reactions.</p> <p>Gases, solids, liquids and solutions. Properties. Ideal gases and related equations. Kinetic theory. Partial pressures of gases. Structural concepts in solids. Types of solids: crystalline and amorphous solids. Vaporization of a liquid equilibrium diagram. Change of states for water.</p> <p>Thermodynamic: state functions and form of energy and their equivalence. Thermochemistry. The concept of equilibrium and LeChatelier principle. The driving force in chemical reactions. Thermodynamics and chemical changes.</p> <p>Nature of solutions and determination of concentration. Colligative properties of solutions.</p> <p>Ionic equilibrium a: solution of ions. Acids and bases following Arrhenius, Bronsted e Lewis definitions. Weak acids and bases, ionisation of water. pH and pOH. Indicators. Hydrolysis and neutralization. Solubility and slightly soluble salts.</p> <p>Electrochemistry: Galvanic cells and electrolysis. Faraday's laws. Oxidation-reduction potentials. Nernst's equation. pH-meter.</p> <p>Chemical kinetics: factor affecting the reaction rate. Kinetic order and reaction mechanism. Arrhenius equation. Activation energy and catalysis.</p> <p>The chemistry of carbon</p> <p>Different kind of carbon Isomerism. Stereochemistry. Chirality and enantiomers. R, S convention. Optical activity.</p> <p>The IUPAC nomenclature system. Nomenclature, properties and reactivity of alkanes, alkenes, alcohols, phenols, ethers, haloalkanes, aldehydes and ketones, carboxylic acids and functional derivatives, amines.</p> <p>Aromatic compounds. Benzene: structure, aromaticity and resonance energy. Nomenclature of substituted benzenes and aromatic heterocyclic compounds.</p> <p>Main monosaccharide.</p> <p>Aminoacids: main aspects, classification, properties. Nucleotide bases.</p>
Course program	
Reference books	<ul style="list-style-type: none"> <li>• A.M. Manotti Lanfredi e A. Tiripicchio <b>Fondamenti di Chimica</b>, Ambrosiana, Milano</li> <li>• I. Bertini, C. Luchinat, F. Mani <b>Chimica</b>, Ambrosiana, Milano</li> <li>• S. Schiavello, L.Palmisano. <b>Fondamenti di Chimica</b>, Edises, Napoli</li> <li>• Lausarot, Vaglio, <b>Stechiometria per la Chimica Generale</b>, Piccin, Bologna</li> <li>• A.Caselli, S.Rizzato, F. Tessore. <b>Stechiometria</b> del testo di Freni e Sacco. Edises, Napoli</li> <li>• P.W. Atkins, General Chemistry, United State By Scientific American Book.</li> <li>• K.W. Whitten et al. General Chemistry, seventh edition, Brooks/Cole Inc.</li> </ul>
Notes	
Teaching methods	Course contents will be presented through PC assisted tools (Powerpoint).

Evaluation methods	<p>The exam consists of an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom and in the laboratory/production plants, as reported in the Academic Regulations for the Bachelor Degree in Food Science and Technology (article 9) and in the study plan (Annex A). Students attending at the lectures may have a middle-term preliminary exam, consisting of a written test, relative to the first part of the program, which will concur to the final evaluation and will be considered valid for a year.</p> <p>The evaluation of the preparation of the student occurs on the basis of established criteria, as detailed in Annex B of the Academic Regulations for the Bachelor Degree in Food Science and Technology.</p> <p>Non-Italian students may be examined in English language, according to the aforesaid procedures.</p>
Evaluation criteria	<p><i>Knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describe atoms and molecules structure and of chemical and physico-chemical laws ruling transformation processes of materials in inorganic and organic field</li> </ul> <p><i>Applying knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Describe the importance of chemical studies to understand the energetic and kinetics of matter transformation</li> </ul> <p><i>Making informed judgements and choices</i></p> <ul style="list-style-type: none"> <li>○ Capacity to understand the importance of chemical and physico-chemical laws ruling transformation processes of materials in inorganic and organic field</li> </ul> <p><i>Communicating knowledge and understanding</i></p> <ul style="list-style-type: none"> <li>○ Capacity to describe the constituents of matter and chemical phenomena related</li> </ul> <p><i>Capacities to continue learning</i></p> <ul style="list-style-type: none"> <li>○ Capacity to understand phenomena related to transformation and conservation of food</li> </ul>
Receiving times	All afternoons previous telephonic or E-mail appointment