General Information	
Academic subject	General Chemistry
Degree course	Bachelor programme: Food Science and Technology
ECTS credits	6 ECTS
Compulsory attendance	No
Teaching language	Italian

Subject teacher	Name Surname	Mail address	SSD
	Roberto Terzano	roberto.terzano@uniba.it	AGR/13

ECTS credits details		
Basic teaching activities	4 ECTS Lectures	2 ECTS Laboratory classes

Class schedule	
Period	I semester
Course year	First
Type of class	Lectures. Exercises.

Time management	
Hours	150
In-class study hours	60
Out-of-class study hours	90

Academic calendar	
Class begins	October 18, 2021
Class ends	January 28, 2022

Syllabus	
Prerequisites/requirements	
Expected learning outcomes	*Knowledge and understanding* ○ Basic knowledge of the structure of atoms and molecules, and of the chemical and physico-chemical laws ruling the transformation processes of organic and inorganic substances *Applying knowledge and understanding* Ability to utilize basic chemistry notions to understand phenomena related to food transformation and conservation*Making informed judgements and choices* ○ Awareness and autonomy of judgment to use the knowledge in the subsequent courses *Communicating knowledge and understanding* ○ Ability to describe the constituents of matter and related chemical phenomena affecting their transformations *Capacities to continue learning* ○ Ability to deepen and update the knowledge about chemical-physical and chemical processes 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)
Contents	**Atoms and molecules** Atomic architecture. Electronic structure of atoms. Atomic models. Orbital symbolism. Periodic table and periodic properties. Atomic sizes. Ionization energy, electron affinity and electronegativity. Atomic weight and related quantities. Ions. Molecules. Formula and molecular weight. Avogadro number and mole concept.

	Chemical bonding Covalent bonding. Electronegativity. Bond polarity and dipolar momentum. Ionic bonding. Coordination bonding. Metallic bonding. Dipole bonding and van der Waals forces. Hydrogen bond. Lewis and valence bonding theories. Multiple bonding. Molecular orbitals. The structure of molecules. VSEPR theory. Hybridization. Resonance and resonance structures. **Chemical reactions and stoichiometry** Chemical nomenclature of inorganic substances. Oxidation number. Chemical formulas and equations. Stoichiometry. Weight relations in chemical equations. Oxidation-Reduction reactions. Limiting reagent. **Gases, solids and liquids** Properties. Ideal gases and related equations. Kinetic theory. Gas mixtures and partial pressure of gases. Structural concepts in solids. Types of solids: crystalline and amorphous solids. Vaporization of a liquid. Phase equilibrium diagram. Change of states for water. **Solutions** Solvent and solute. Nature of solutions and expression of concentration: weight percentage, molar fraction, molarity, ppm and ppb. Chemical equivalent and normality. Henry's law. Raoult's law. Colligative properties of solutions. Electrolites and non electrolites. **Thermodynamics** Thermodynamic systems. State functions and form of energy and their equivalence. Thermochemistry. Enthalpy. Entropy. Free energy and spontaneity criteria. Thermodynamics principles. **Chemical equilibrium** The concept of equilibrium and Le Chatelier principle. Equilibrium constant. Homogeneous and heterogeneous equilibria. The driving force in chemical reactions. **Ionic equilibria in water solutions.** Water ionization. Acids and bases according to Arrhenius, Brönsted and Lewis definitions. Weak acids and bases. pH and pOH. Polyprotic acids. Anfolites. pH determination of diluted water solutions. Hydrolysis and neutralization. Buffer solutions. Basics of titration and indicators. Solubility and slightly soluble salts. Solubility product and common ion effect. **Electrochemistry** Galvanic cells and electrolysis. Oxidation-reduction potentials. Electrodes. Daniell's cell. Nernst's equation. pH-meter. **Chemical kinetics** Reaction rate. Factors affecting the reaction rate. Kinetic order and reaction mechanism. Arrhenius equation. Activation energy and catalysis.
Course program	

Reference books	• Lecture notes and teaching material made available during the course • A.M. Manotti Lanfredi, A. Tiripicchio, **Fondamenti di Chimica**, Casa Editrice Ambrosiana, Milano • P.M. Lausarot, G.A. Vaglio**, Stechiometria per la Chimica Generale**, Piccin, Bologna • P.W. Atkins, **General Chemistry**, Scientific American Books, U.S.A. • K.W. Whitten et al., **General Chemistry**, 7th edition, Brooks/Cole Inc.
Notes	
Teaching methods	Course contents will be presented through PowerPoint, blackboard and multimedia tools.
Evaluation methods	The exam consists of a written test and an oral dissertation on the topics developed during the theoretical and theoretical-practical lectures in the classroom, 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 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 one year. The evaluation of the skills 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. Non-Italian students may be examined in English language, according to the aforesaid procedures.
Evaluation criteria	*Knowledge and understanding* ○ Knowledge of the structure of atoms and molecules and the chemical and physico-chemical laws ruling the transformation processes of inorganic and organic substances *Applying knowledge and understanding* ○ Applying chemical knowledge to understand the energetic and kinetics of matter transformations *Making informed judgements and choices* ○ Ability to apply the chemical and physico-chemical laws to understand the transformation and conservation of food and choose the correct procedures *Communicating knowledge and understanding* ○ Ability to describe the constituents of matter and related chemical phenomena *Capacities to continue learning* ○ Ability to understand phenomena related to transformation and conservation of food
Receiving times	Every day on appointment to be defined by e-mail.