



## GENERAL AND INORGANIC CHEMISTRY (SURNAMES A-K)

<b>Enrollment year</b>	2021/2022
<b>Academic year</b>	2021/2022
<b>Regulations</b>	DM270
<b>Academic discipline</b>	CHIM/03 (GENERAL AND INORGANIC CHEMISTRY)
<b>Department</b>	DEPARTMENT OF BIOLOGY AND BIOTECHNOLOGY "LAZZARO SPALLANZANI"
<b>Course</b>	BIOLOGICAL SCIENCES
<b>Curriculum</b>	PERCORSO COMUNE
<b>Year of study</b>	1°
<b>Period</b>	(01/10/2021 - 14/01/2022)
<b>ECTS</b>	9
<b>Lesson hours</b>	76 lesson hours
<b>Language</b>	Italian
<b>Activity type</b>	WRITTEN TEST
<b>Teacher</b>	NICOLIS STEFANIA - 9 ECTS
<b>Prerequisites</b>	Basic knowledge of mathematics provided in upper secondary school.
<b>Learning outcomes</b>	The course aims to give to the students the basic chemical background needed to understand the chemical aspects of biological systems.
<b>Course contents</b>	Atoms: atomic and mass numbers, isotopes, radioactivity, atomic and molecular weights, molar mass. Atomic structure, atomic orbitals, quantum numbers, energy and filling of the orbitals. Electronic configuration. Periodic table and periodic properties. Nomenclature. Ionic, covalent and metallic chemical bonds. Covalent bond: diatomic molecules, sigma and pi-greek bonds, geometry of polyatomic molecules, resonance, formal charges, structural formulas, exceptions to the octet rule, hybrid orbitals. Polarity in covalent bonds and dipole moment. Intermolecular forces, hydrogen bonding. Chemical reactions: classes of reactions, stoichiometric coefficients, balance, yield. States of

	<p>aggregation. Mixtures: suspensions, colloids and solutions. Liquid solutions: concentration, density, dilution, titration, electrolyte solutions, colligative properties. Chemical kinetics. Chemical equilibrium: equilibrium constant, reaction quotient, Le Chatelier's principle. Acids and bases: Bronsted-Lowry theory, acids and conjugate bases, pH, <math>K_a</math>, hydrolysis, buffer solutions, polyprotic acids, Lewis acids and bases, acid-base titrations, indicators. Solubility equilibria. Thermodynamics. Electrochemistry. Laboratory exercises: redox titration, acid-base titration, potentiometric determination of the pH of buffer solutions.</p>
<b>Teaching methods</b>	<p>Interactive lectures carried out through presentations (PowerPoint, available on KIRO) projected on the screen and in-depth analysis on the blackboard.</p> <p>The course includes numerical exercises in the classroom carried out by the teacher in the morning and by a tutor in the afternoon.</p> <p>The topics presented in the lectures are also verified with practical exercises in laboratory which require attendance, with students being divided into shifts and taking place in December/January.</p>
<b>Reccomended or required readings</b>	<p>The teaching material (the slides projected in class and the exercises carried out in the classroom) is available on the KIRO platform.</p> <p>Some supporting texts:</p> <ul style="list-style-type: none"> <li>· Whitten, Davis, Peck, Stanley. CHIMICA (Piccin)</li> <li>· Petrucci, Herring, Madura, Bissonette. CHIMICA GENERALE (Piccin)</li> <li>· Kotz, Treichel, Townsend. CHIMICA (EdiSES)</li> <li>· Atkins, Jones, Laverman. FONDAMENTI DI CHIMICA GENERALE (Zanichelli)</li> <li>· Robinson, McMurry, Fay. CHIMICA GENERALE (Pearson)</li> </ul>
<b>Assessment methods</b>	<p>Written examination including open-ended theory questions, tables to be completed, structural formulas, exercises with reactions to balance and numerical calculations, as well as the compilation of a laboratory sheet relating to one of the practical experiences carried out during the didactic laboratory (the drafting of laboratory reports is not required).</p> <p>There is no oral interview.</p>
<b>Further information</b>	<p>In order to access the didactic laboratory it is mandatory to participate in the safety training courses available in KIRO:</p> <ul style="list-style-type: none"> <li>- Formazione GENERALE</li> <li>- Formazione SPECIFICA – Rischio BASSO</li> <li>- Formazione SPECIFICA – Rischio MEDIO</li> </ul> <p>"Chi ben comincia.- Sicurezza nei laboratori chimici e biologici"</p>
<b>Sustainable development goals - Agenda 2030</b>	<p>7 9 12  <a href="#">The goals</a></p>