



## GENERAL AND INORGANIC CHEMISTRY (SURNAMES L-Z)

<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>	DACARRO GIACOMO - 9 ECTS
<b>Prerequisites</b>	Basic mathematics skills from secondary school. The course requires no specific chemical skills.
<b>Learning outcomes</b>	The course aims to give to the students a basic chemical background necessary to the understanding of the chemical aspects of biological systems.
<b>Course contents</b>	Structure of the atom, periodic properties of the elements. Atomic and molecular masses, mole. Chemical reactions, reaction equations, stoichiometric calculations. Ionic and covalent bonds, structure and geometry of molecules. Polar bonds, the hydrogen bond. Nomenclature of ionic and covalent compounds, oxidation states. Interactions between molecules, states of aggregation. Solutions, properties of solutions, colloids.

Chemical kinetics: rate law of a reaction, rate constant, catalysis, enzymes.

Chemical equilibria: equilibrium constants; spontaneous and non-spontaneous reactions. Le Chatelier's principle.

Equilibria in aqueous solution: acid-base reactions, acidity and basicity constants, strength of acids and bases, buffer solutions. Lewis acid-base adducts; coordination compounds.

Precipitation reactions: solubility product, common ion effect, dissolution of precipitates.

Oxidation-reduction reactions: electrochemical cells, electrode potentials. Standard potentials series. Relationship between electrode potential and concentration, Nernst's equation.

Energy exchanges at the equilibrium: relationship between free energy change and equilibrium constant of a reaction.

The theoretical principles discussed in the lectures will be verified through numerical exercises and laboratory experiments (redox and acid-base titrations, preparation and properties of buffer solutions).

#### Teaching methods

Classes with the support of presentations (PowerPoint, available on KIRO after the class) on screen and exercises at the blackboard.

The course is completed by exercise classes with the professor in the morning, and with a tutor in the afternoon.

The arguments of the course will be verified also with practical experiments in the lab, with compulsory attendance. Laboratory will take place in January.

#### Reccomended or required readings

All the teaching material (power point slides and exercises) is available on KIRO

Suggested textbooks:

- Kotz, Treichel, Townsend. Chimica. EdiSES
- Whitten, Davis, Peck, Stanley. Chimica. Piccin
- Atkins, Jones. Fondamenti di chimica generale. Zanichelli
- Petrucci, Herring, Madura, Bissonnette Chimica Generale Piccin

#### Assessment methods

The exam consists in a written test. During the course, the exam can be taken as two "in itinere" tests. Passing the first test is required to access to the second one. In alternative, the exam can be taken in a single final test, starting from the month of February. Both the partial and the final tests consist of theoretical questions, exercises and a question on the laboratory experiments (no written reports on the laboratory are required before the exam).

#### Further information

The exam consists in a written test. During the course, the exam can be taken as two "in itinere" tests. Passing the first test is required to access to the second one. In alternative, the exam can be taken in a single final test, starting from the month of February. Both the partial and the final tests consist of theoretical questions, exercises and a question on the laboratory experiments (no written reports on the laboratory are required before the exam).

#### Sustainable development goals - Agenda 2030

[The goals](#)