# Elementary Chemistry (plus Workshop on Elementary Chemistry)

## Prof. Elisa Appiani

***COURSE AIMS AND INTENDED LEARNING OUTCOMES***

***Knowledge and understanding***

The course aims to provide students with an organic framework of clear and complete knowledge, from a historical, epistemological and anthropological point of view, regarding the fundamental core concepts and main contents of chemistry, trying to make students understand the importance of this discipline not only as a central science that connects the other natural sciences, but also and above all as an essential study subject capable of providing a correct interpretation of a large part of everyday phenomena. The course will offer the conceptual tools necessary for a general understanding of the methods of scientific investigation, initiating and supporting reflection on approaches that allow students to embrace and stimulate their curiosity about phenomena that can be described in chemical terms, inviting and leading them to build a scientifically correct knowledge through individual and group experimental research.

***Ability to apply knowledge and understanding***

At the end of the course, the teacher will be able to:

* carry out teaching activities, especially workshops, based on the inductive method and the experiential approach, useful for encouraging students to learn the scientific method;
* build scientific learning situations, based on the valorisation of games, of manipulation and collaboration among students, which allow them to overcome fears and resistance towards this knowledge;
* design educational paths based on observation, research and the strengthening of metacognitive skills;
* promote the students’ development of knowledge and skills to recognise chemical processes in everyday life and describe them using correct and accurate scientific terminology;
* understand and promote the value of technical scientific knowledge as fundamental for education in citizenship, health, sustainability, and environmental protection.

***COURSE CONTENT***

The course will cover the following general chemistry topics that are closely connected to phenomena related to everyday life, including proposals for teaching activities and learning paths:

* the classification of matter based on composition: mixing or blending (homogeneous and heterogeneous) and pure substances (elements and compounds;
* macroscopic and microscopic properties of matter in the different physical states of aggregation;
* physical transformations: phase changes of matter aggregation;
* properties of liquids (cohesive forces and surface tension, adhesion forces, capillary action, viscosity);
* the microscopic structure of matter: the structure of the atom, orbitals and electronic configuration;
* the periodic table of chemical elements and the periodic properties of the elements;
* chemical bonds: ionic and covalent (pure, polar and dative) with examples of simple compounds;
* the shape and properties of molecules, intermolecular forces;
* solutions;
* the concepts of atomic mass and mole;
* chemical reactions;
* macromolecules: carbohydrates; lipids; amino acids and proteins; nucleic acids: DNA and RNA.
* environmental pollution (outline).

The course is supplemented by teaching-workshop activities held by experts and characterised by specific themes and methodologies agreed with the teacher. Each workshop session will be aimed at producing an educational project that will be assessed by the workshop leader on the basis of parameters shared with the teacher and based on criteria such as: conceptual correctness, completeness, consistency, originality, didactic usability.

***READING LIST***

Materials made available by the teacher on the Blackboard page of the course.

Any chemistry text for scientific high school that deals with the topics included in the course syllabus.

***TEACHING METHOD***

The course consists of 30 hours of lectures and is supplemented by classroom workshop activities (20 hours).

***ASSESSMENT METHOD AND CRITERIA***

The exam is oral. The exam will consist of the discussion of an authentic task linked to an educational path for nursery or primary school focused on one of the topics covered in the course or agreed with the workshop leader. The authentic task must be sent via e-mail to the workshop leader at least 10 days before the exam session date. The discussion of the authentic task will specifically concern a critical analysis of the paper in reference to the methodology used within the training path and the correctness of the contents covered. Following the discussion of the authentic task, students must be able to answer open-ended questions on topics covered during the course, not necessarily linked to the topic addressed in the authentic task.

The assessment will be based on the relevance of the students’ answers, their appropriate use of specific terminology and the reasoned and consistent structuring of the speech, as well as the ability to make connections among the topics covered.

Access to the exam is subject to attendance at the workshop.

***NOTES AND PREREQUISITES***

Students are not required to have previous knowledge in the chemical field.

Further information can be found on the lecturer's webpage at http://docenti.unicatt.it/web/searchByName.do?language=ENG or on the Faculty notice board.