Title

Operationalisation of Essential Learning in Chemistry

Scope

This initiative aligns seamlessly with the activity plan of the proposing institution, as outlined in the statutes of the Polytechnic of Tomar (IPT), which define “IPT as a polytechnic institution within the European higher education framework. The institution is distinguished by its strengths in science, technology, arts, and humanities — areas that have complemented one another since its foundation — delivering higher education that cultivates relevant knowledge, skills, and competencies, while preparing students for the workforce and active participation in a democratic society”. IPT also undertakes, as part of its mission: (...) to expand access to knowledge for the benefit of individuals and society, through research, education, and cooperation, within a project aimed at the holistic development of the individual; active participation in building a European space for research and education, and in a regional development model based on the creation, innovation, and enhancement of scientific and technological knowledge (...)".

In line with this, this proposal for the Microcredential Course is submitted for approval, comprising 2 ECTS credits and a total workload of 54 hours: 6 hours of synchronous classes, 6 hours of in-person lab activities, and 3 hours of asynchronous instruction.

Context

This training initiative is the result of a request from the Portuguese Association of Physics and Chemistry Teachers for IPT to offer instruction in specific Physics and Chemistry topics, previously identified and reflected in the Action Structure detailed above. It is entirely appropriate to respond favourably to the request, as it already aligns with the daily academic practices carried out at IPT.

Target Audience

Secondary School Physics and Chemistry Teachers

Student Places

The minimum number of places is ten (10) and the maximum is thirty (30).

Course Structure

- Chemical Elements and the Periodic Table;
- Atomic Spectra and Flame Tests;
- Nomenclature of inorganic compounds;
- Chemical bonding, properties, and reactivity;
- Quantitative aspects of chemical reactions;
- Acid-Base reactions; chemical equilibrium and reaction extent;
- Solutions and solubility equilibrium;
- Sensors.

First experimental assignment: “Preparation and standardisation of solutions" - applying concepts such as preparing solutions from solid solutes, solution dilution, and acid-base titrations (monitoring the reaction using potentiometric and conductimetric sensors).
Second experimental assignment: “Metals, flame colours, and salt solubility” - applying concepts of atomic spectra and flame tests as well as solution chemistry and solubility equilibrium. Observation of spectra using a diffraction grating (flame test and gas discharge lamp).

Assessment Method

- Laboratory work and submission of group experimental reports – 50%.
- Submission of an individual written assignment on a topic to be defined by the instructors – 50%.