

Title:

## **Green Chemistry and Environmental Sustainability**

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, the present proposal for the Microcredential Course is hereby submitted for approval. The course is worth 3 ECTS credits corresponding to a total workload of 81 hours, including 19 hours of synchronous classes and 6 hours of asynchronous learning.

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 Teachers in the areas of Physics/Chemistry, Biology and Natural Sciences.

Student Places

The minimum number of places is fifteen (15) and the maximum is sixty (60).

### Course Structure

- Green Chemistry/Green Engineering: concepts, objectives and methodologies; the 12 Principles of Green Chemistry; Green Engineering — the "second" 12 principles; laboratory and industrial case studies.
- Water and Soil: bioremediation of soils and biological treatment of waste; green technologies for wastewater treatment.
- Atmosphere: composition of the earth's atmosphere and pollutant gases; ozone in the troposphere and stratosphere; reactivity of free radicals and their effects on the atmosphere; environmental issues related to air pollution.
- Resources, fuels and polymers: raw materials and natural resources; material and energy recovery through recycling; biofuels and green fuels; oil recycling; polymers and biomaterials; plastic recycling.

### Assessment Method

Group presentation and submission of a written assignment on a topic to be determined by the instructors.