PhD Program in Process Engineering

1. General Description

The PhD in Process Engineering is an advanced academic program focused on scientific research and innovation. It is structured around three main areas: chemical engineering, environmental engineering, and pharmaceutical engineering. This program aims to train researchers capable of designing, optimizing, and developing efficient, sustainable processes that meet current industrial and environmental challenges.

2. Main Research Areas

- Treatment of industrial and domestic wastewater (biological, physico-chemical, membrane processes, etc.)
- Drinking water treatment
- Valorization of organic waste for biogas (methane) production
- Formulation systems for pharmaceutical, cosmetic, environmental, and agri-food sectors
- Extraction and valorization processes for essential oils and other natural compounds
- Process design and optimization using modeling and numerical simulation

3. Core Courses

The core courses offered in this doctoral program are designed to strengthen the doctoral candidates' cross-disciplinary and scientific skills. These courses include:

- Advanced analytical techniques
- Artificial intelligence applied to process engineering
- Information and communication technologies (ICT)
- Scientific English
- Scientific programming
- Philosophy of science
- Didactics and university pedagogy

4. Advanced Topics

Advanced topics are proposed to enable doctoral students to further specialize in key areas closely related to their research. These topics include:

- Advanced water treatment (oxidation, membranes, hybrid processes, etc.)
- Process simulation and modeling (CFD, multi-scale models, etc.)
- Process intensification and clean technologies
- Bioprocesses and biomass valorization
- Complex and multifunctional formulation systems
- Assisted extraction processes (microwave, ultrasound, supercritical fluids)
- Sustainable design and environmental assessment of processes (Life Cycle Assessment - LCA)

5. Training Objectives

The primary objective of the PhD in Process Engineering is to train autonomous researchers capable of:

- Conducting original and innovative scientific research
- Using advanced analytical, digital, and experimental tools
- Disseminating results through publications and practical applications
- Contributing to sustainable development through relevant technological solutions
- Participating in national and international research and development projects