

**MSc degree in
Green Chemistry and Clean Technologies
Department of Chemistry of the University of Patras
in collaboration with academic staff of the
Department of Chemical Engineering of the University of Patras
Coordinator: Professor Constantine Poulos
Academic year 2012-2013**

General Description

The program aims are the education and training of graduates in the philosophy and the tools of Green Chemistry and their application in the design of environmentally friendly products and processes, using clean technologies, for Sustainability.

First Semester

- Green Chemistry and Catalysis in Green Chemistry 10ECTS
 - The environmental impact of chemical processes and alternative solvents 10ECTS
 - Literature Review and Research Methodology 10ECTS
- Total 30ECTS

Second Semester

- Chemicals and Energy from Renewable Feedstock's 10ECTS
 - Energy Efficiency, New Technologies and Industrial Ecology 10ECTS
 - Launch of Research Activities for MSc Thesis 10ECTS
- Total 30ECTS

Third Semester

- MSc Thesis: Completion of the research project. Writing and Defense of the Thesis 30ECTS
- Total 30ECTS

Courses

First Semester

► Green Chemistry and Catalysis in Green Chemistry

The cost of wastes and the changes in chemical industry

Green Chemistry: Definition, philosophy and tools

The 12 Principles of Green Chemistry

Green Chemistry metrics

Clean technologies that green chemistry offers

Design of products and processes for sustainability, legislation

Life Cycle Assessment. Measurement of the greenness of processes and of products

Catalysis in Green Chemistry

Introduction to the catalysis in green chemistry

Heterogeneous acidic catalysis in industry

Structured mesoporous materials as green catalysts
Biocatalysts
Envirocats™, the case of industrial green catalysts

► **The environmental impact of chemical processes and alternative solvents**

Pollutants and processes for immediate solutions through green chemistry
Legislation for new chemicals
Environmental management of several systems
Control and following of wastes
Techniques for minimization of wastes
Recycling, reuse and recovery for wastes
Ecotoxicology
Management of liquid wastes
Management of solid wastes
Methods of thermal treatment of wastes
Biological methods for treatment of wastes
Alternative solvents for chemical reactions and processes (ionic liquids, water and supercritical fluids)

► **Literature Review and Research Methodology**

Second Semester

► **Chemicals and Energy from Renewable Feedstock's**

Renewables: Advantages and disadvantages
Biomass: Properties, chemical composition, financial factors
Biorefinery: technologies and biorefineries of phase I, II and III
Biotechnological methods for the production of biofuels
Gasification of biomass
Pyrolysis of biomass Platforms of chemicals from biomass and their applications

► **Energy Efficiency, New Technologies and Industrial Ecology**

Energy and clean technologies; renewable resources, production of hydrogen
Fuel cells
Photocatalysis
Industrial ecology

Third Semester

► **MSc Thesis: Completion of the research project. Writing and Defence of the Thesis**

► **Faculty members**

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