Postgraduate Studies Program
«ENVIRONMENTAL ENGINEERING»

Specialization: 3-SEC: ENVIRONMENTAL MANAGEMENT, SUSTAINABLE ENERGY AND CLIMATE CHANGE

<table>
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<tr>
<th>Code:</th>
<th>SEC 309</th>
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<tr>
<td>Course:</td>
<td>Special Topics of Catalytic Surfaces and Catalytic Processes for Environmental Applications</td>
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<td>Required:</td>
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<td>Elective:</td>
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Instructor: Assistant Professor Paraskevi Panagiotopoulou

Bibliography
3. Atmospheric Pollution: Global influences, Control and Alternative control technologies, I.V. Yentekakis, 2nd Ed., Kleidarthismos Publ., Athens 2010

Course objectives
The course deals with heterogeneous catalytic and photocatalytic processes related to environmental applications through the analysis of advanced technologies applied in industry or being under investigation. Of particular interest is the investigation of (Photo)catalytic processes for gas emissions control as well as for treatment/control of various pollutants found in liquid industrial waste.

Syllabus
1st week
Introduction to heterogeneous catalysis, basic types of solid catalysts and photocatalysts, evaluation of catalytic properties, desired characteristics.

2nd week
Synthesis and characterization methods of catalytic and photocatalytic materials.

3rd week
Catalytic processes for the control of nitrous oxides (NOx and N2O) emissions.

4th week
Catalytic processes for the control of carbon monoxide (CO) and carbon dioxide (CO2) emissions.

5th week
Catalytic processes for the control of methane (CH4) emissions.

6th week
Catalytic processes for controlling sulfur oxides (SOx) emissions and various pollutant/toxic compounds.
7th week
Catalytic processes for the control of volatile organic compounds (VOCs).

8th week
(Photo)catalytic decomposition of organic and inorganic components (e.g., azo dyes, phenols, chlorophenols, surfactants, organic acids etc.) found in liquid and agricultural industrial waste.

9th week
Advanced (photo)catalytic oxidation processes for mineralization of organic pollutants present in water and wastewater.

10th week
(Photo)catalytic water disinfection. Air purification and disinfection.

11th week
(Photo)catalytic removal and recovery of dissolved metals

12th week
(Photo)catalytic oxidation of inorganic ions in aqueous media (nitrite to nitrate, sulphite to sulphate, cyanide to isocyanates, nitrogen or nitrate).

13th week
Students project presentations related to a specialized topic of their choice.

Work load
A. A bibliographic content project presentation.

Student evaluation
1. Project (50%)
2. Final exam (50%)