Specialization: 2-WWT: WATER AND WASTE TREATMENT

Code: WWT 201  Course: Solid and Toxic Waste Management

<table>
<thead>
<tr>
<th>Required:</th>
<th>Elective:</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

1st semester | 2nd semester |  |  |

Instructors: Professor Evangelos Gidarakos

**Bibliography**


**Course objectives**

The course focuses on the qualitative and quantitative analysis, the management procedures and the design of the main processes required for the effective treatment of the Municipal Solid Waste (MSW) and the Hazardous Waste (HW), respectively.

Additionally, the course includes:
1) Conduction of series of laboratory exercises.
2) Conduction of a Project Design Course with specific issues:
   a) Design of a municipal solid waste incineration plant as a source of heat and energy production,
   b) Design of a Mechanical Biological Treatment (MBT) waste plant

**Syllabus**

- Characterization, qualitative and quantitative Municipal Solid Waste (MSW) analysis
- Recycling, recycled materials (paper, glass, metallic materials, plastic and batteries). Resources Optimization in a recycling society, economic sustainability.
- Methods of mechanical / biological treatment: aerobic composting, anaerobic digestion
• Thermal processes: incineration, pyrolysis, gasification
• Environmental sustainability and economic viability of heat treatments
• Disposal, landfills, leachates production and composition, biogas production and composition
• Production of secondary fuels, mining landfills (technical reservoirs of secondary resources)
• Hazardous waste: Main characteristics, classification, labeling, storage and transport
• Toxicology: Definition and types of environmental toxicology, environmental pollutants
• Risk analysis - Risk assessment
• Hazardous Waste Management
• Dioxins (PCDDs), Furans (PCDFs) and Polychlorinated Biphenyls (PCBs)

Workload

Lab exercises

A) MUNICIPAL SOLID WASTE
1. Moisture, ash and volatile matter determination
2. Elemental analysis and calorific value
3. Bioreactor waste

B) HAZARDOUS WASTE
1. Toxicity Assessment of solid environmental samples
2. Flash point of liquid substances determination - Risk assessment
3. Adsorption of toxic substances on charcoal

Student evaluation
1. Lab reports (20%)
2. Project (30%)
3. Final exam (50%)