TECHNICAL UNIVERSITY OF CRETE
SCHOOL OF ENVIRONMENTAL ENGINEERING

Code:	ENVE 438	**Course:**	Treatment and Management of Toxic and Hazardous Wastes

Mandatory:	X	**Elective:**		**Specialization:**	

Semester	**F**		**S**	X	**Teaching Units**	4	**ECTS** 6

Teaching Hours per week:	**T**	3	**E**	1	**L**	2/2

Instructors: E. Gidarakos

Textbooks (Eudoxus): Ευάγγελος Γιδαράκος, 2006. Επικίνδυνα Απόβλητα – Διαχείριση, επεξεργασία, διάθεση, Εκδόσεις ΖΥΓΟΣ, Θεσσαλονίκη

Other recommended books:

1. LaGrega D. Michael, Buckingham L. Phillip, Evans C. Jeffrey, 2001. Hazardous Waste Management, McGraw-Hill.
2. Watts J. Richard, 1997. Hazardous Wastes: Sources-Pathways-Receptors.

Notes: E-class (Exercises – Laboratory guide)

Labs:	**# of lab exercises:**	5	**Individual Reports**		**Team Reports**	X	
			Lab final written exam	X	**% of Final Lab Grade**	50	

Final Grade:	**Final Exam**	70	%
	Project		%
	Labs	30	%
	Other ( )		%

Course Syllabus:

- Properties and classification of hazardous waste based on their physical and chemical characteristics, treatment and disposal
- Distribution of pollutants in the environment and effects in human health, materials, vegetation, air (hazardous waste in the geosphere, hydrosphere, atmosphere, biosphere)
- Introduction
  - Existing Condition
  - Hazardous waste in Greece
- Hazardous waste
  - Definition of toxic and hazardous waste
  - Classification
  - Labeling
  - Current legal framework

- Toxicology and Risk Analysis
  - Basic concepts of toxicology
  - Basic principles of risk analysis
- Hazardous waste Management
  - Reduction-minimization of waste production at source
  - Reuse and recovery
  - Recycling
  - Storage
  - Transfer
  - Treatment
  - Final disposal
  - Life cycle analysis (LCA)
- Toxic waste landfilling
  - Design of landfills for hazardous waste
  - Site selection
  - Identification and control of incoming waste
  - Construction
  - Operation
  - Monitoring
  - Security and emergency situations
  - Closing the landfill
- Physicochemical treatment processes
  - Flocculation and agglomeration
  - Sedimentation
  - Flotation
  - Filtration
  - Evaporation
  - Neutralization
  - Chemical oxidation - reduction
  - Sorption
  - Advanced oxidation processes
  - Solidification / stabilization
- Thermal treatment processes
  - Incineration - Combustion
  - Pyrolysis
  - Gasification
  - Plasma Technology
  - Mechanisms of formation and behavior of gaseous pollutants
  - Problems with municipal waste incineration
  - Combustion equations and mass balances
  - Energy balance
  - Legislation
- Examples
  - Asbestos
  - Dioxins and furans
  - Polychlorinated Biphenyls
  - Radioactive Waste