COURSE ID SHEET

Course No.	5253	NTUA

Semester:	8	Core	X	Elective		Specialization	

Title: **ENVIRONMENTAL ENGINEERING**

Aim: The aim of the course is to familiarize students with environmental issues and to protect the environment from anthropogenic activities. Analysis of relevant processes and design of gas, liquid and solid waste treatment plants.

Content:

- **LIQUID WASTE**. Qualitative and quantitative characteristics of municipal and industrial wastewater. Processing targets and flowcharts. Design of pre-treatment processes: grating, flow equilibration, neutralization, sand collection, fat collection. Primary treatment planning: flocculation and aggregation, sedimentation, flotation. Secondary treatment: General principles, design of active sludge. Secondary sediment design. Design of biological filters. Nitrogen and phosphorus removal: physico-chemical and biological processes. Design of integrated organic and nutrient removal systems. Natural treatment systems: wetlands. Tertiary treatment: disinfection, ion exchange, reverse osmosis.
- **SOLID WASTES**. Qualitative and quantitative characteristics of solid waste. Design of a waste collection system. Recycling and mechanical separation of solid waste. Design and selection of equipment. Solid waste composting design. Anaerobic digestion. Design of Anaerobic Digesters. Thermal treatment of solid waste (incineration, pyrolysis, gasification). Landfill Design.
- **GASEOUS WASTES**. Qualitative and quantitative characteristics of waste gas and treatment objectives. Source pollution control. Design of air pollution control devices. Testing of floating particles. Classification of particles based on their size and penetration. Design of control processes. Design of sedimentation chambers. Cyclone design. Design of floating particle removal units. Bags. Wet cleaners. Electrostatic filters. Gaseous pollutant control. Adsorption column models and design. Design of scrubbers with filler. Application examples: design of SO2 and NH3 removal units.

Hours per semester:

LECTURES	32	EXERCISES	16	LABORA-TORY		HOME-WORK	102	**TOTAL HOURS: 150**

Student performance/ evaluation:

The evaluation of the students will be done through:

- A Final (written) Examination (FE), including the solving of exercises using books and notes, and optional through:
- Exercises (E), or

The Final Grade results as follows: Final Grade = (FE) (1+0.3 x (E)