COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Technology		
ACADEMIC UNIT	Department of Environmental Sciences		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**AE808**	**SEMESTER**	**8th**
COURSE TITLE	**ANAEROBIC PROCESSES – ENVIRONMENTAL and ENERGY APPLICATIONS**		
INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**	
Teaching Hours	3	3	
COURSE TYPE	Specialised general knowledge		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/ENV_U_165/		

(2) LEARNING OUTCOMES

Learning outcomes

The aim of the course is to reinforce students' knowledge on anaerobic biological processes and their use in environmental protection and restoration, and bioenergy production.

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently
- Team work
- Respect for the natural environment
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

- Aerobic and anaerobic processes – basic characteristics.
- Kinetics and microbiology of anaerobic digestion, factors affecting kinetics: pH, ammonia, temperature, trace elements, etc.
- Applications in environmental protection: wastewater treatment, sludge treatment, denitrification, reduction of pathogenic microorganisms and odours.
- Types and characteristics of anaerobic bioreactors (digestors), anaerobic digestion for the co-production of heat and electricity (Biomethane), substrates and kinetics (stages) of anaerobic digestion, biofertilizer production.
- Hydrogen sulphide capture techniques, alcohol production, mixed processes (enzymatic and thermophilic anaerobic processes) for chemical production of raw materials from cellulosic by-products and waste.

(4) TEACHING and LEARNING METHODS – EVALUATION

DELIVERY	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Use of PowerPoint slides • View material in video • Communication with students via e-mail • Use of asynchronous distance learning (e-class)

<table>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Study and analysis of bibliography</td><td>36</td></tr>
<tr><td>Course total
(25 hours workload per credit)</td><td>75</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION</td><td>Students' performance is evaluated in the Greek language. The final grade is determined by:
• A written exam (at the end of the semester) that contributes 70% to the final grade, applying one or more of the following evaluation methods: Multiple choice questions, short-answer questions, problem solving.
• The preparation and delivery of an individual written assignment (during the semester) that contributes 30% to the final grade.

Final Grade = 70% Exam Grade + 30% Assignment Grade</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

- EPA (2015) *'Anaerobic digestion and its applications,* https://www.epa.gov/sites/production/files/2016-07/documents/ad_and_applications-final_0.pdf
- Sioulas, K., Al Seadi, T., Rutz, D., Prassl, H., Köttner, M., Finsterwalder, T., Volk, S., Janssen, R. (2009) *Biogas Handbook.* Center for Renewable Energy Sources (CRES), www.lemvigbiogas.com/BiogasHandbookGR.pdf. (in Greek)