COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Technology		
ACADEMIC UNIT	Department of Environmental Sciences		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**AE704**	**SEMESTER**	**7th**
COURSE TITLE	**ECOLOGICAL ENGINEERING**		
INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**		**CREDITS**
Teaching Hours	4		4
COURSE TYPE	Special background		
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_155/		

(2) LEARNING OUTCOMES

Learning outcomes

Upon successful completion of the course, students will have acquired the necessary knowledge, skills and competence, and will be able to:

- Fully comprehend pollutant removal processes from natural systems.
- Apply their skills in designing natural systems for pollutant removal.
- Evaluate the natural and economic conditions for the application of natural systems in waste management.

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

The course focuses on the use of natural systems with low technological and construction requirements, as well as low cost, for the treatment and management of wastewater. Special emphasis will be given to systems that rely on natural and biological processes for wastewater treatment, such as ponds, anaerobic tanks, and wetland systems.

- Introduction to Environmental Sociology: basic concepts and theories.
- Introduction to Ecological Engineering
- Wetland systems: General principles, basic applications, and factors affecting their operation
- Surface flow constructed wetlands
- Subsurface flow constructed wetlands
- Evapotranspiration wetlands
- Microbial processes in constructed wetlands
- Vertical flow wetlands
- Applications of constructed wetlands - case studies
- Stabilization ponds
- Maturation ponds
- Biobeds - Principles of operation and applications

(4) TEACHING and LEARNING METHODS – EVALUATION

<table>
<tr><td>DELIVERY</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>• Use of PowerPoint slides
• Communication with students via e-mail
• Use of asynchronous distance learning (e-class)</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>45</td></tr>
<tr><td>Study and analysis of bibliography</td><td>45</td></tr>
<tr><td>Essay writing</td><td>35</td></tr>
<tr><td>Course total
(25 hours workload per credit)</td><td>125</td></tr>
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<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.
• A mid-semester essay that contributes 30% to the final grade. The essay may be presented by students in class.
Final Grade = 70% Exam Grade + 30% Assignment Grade</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Crites, R.W., Joe Middlebrooks, E., Bastian, R.K., Reed, S.C. (2014) *Natural Wastewater Treatment Systems,* (2nd ed.). London: Taylor & Francis Group.
- Novotny, V. (2020) *Integrated Sustainable Urban Water, Energy, and Solids Management—Achieving Triple Net-Zero Adverse Impact Goals and Resiliency of Future Communities*, (1st ed.) HEAL-Link Wiley UBCM eBooks.
- Tsihrintzis, V.A., *Ecological Engineering and Technology, Volume 2: Natural Methods for Wastewater Treatment.* Komotini: Democritus University of Thrace Publications (in Greek).