COURSE OUTLINE

(1) General information

FACULTY/SCHOOL	TECHNOLOGY			
DEPARTMENT	ENVIRONMENTAL SCIENCES			
LEVEL OF STUDY	*Undergraduate*			
COURSE UNIT CODE	NEW **COURSE**	**SEMESTER**	7	
COURSE TITLE	ECOLOGICAL ENGINEERING			
INDEPENDENT TEACHING ACTIVITIES in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits			**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND			5	5
LABORATORY PRACTICE				
TOTAL			5	5
COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	Scientific Expertise			
PREREQUISITE COURSES:	INTRODUCTION IN ENVIRONMENTAL ENGINEERING, ECOLOGY			
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	Greek			
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No			
COURSE WEBSITE (URL)	-			

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.
It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

Upon completion of the course the students are expected to

- *Get a good understanding of the processes involved in the removal of pollutants from natural systems*
- *Develop skills in the planning of natural systems for the removal of pollutants from wastewaters*
- *Develop the capacities to evaluate natural and economical conditions for the application of*

natural systems in wastewater treatment

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Environmental awareness*
Individual/Independent work	*Social, professional and ethical responsibility and sensitivity to gender issues*
Group/Team work	*Critical thinking*
Working in an international environment	*Development of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Introduction of innovative research	*(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)*
	…….

The teaching methods followed and the course content encourage:

1) The search, analysis and composing of information with the use of relevant technologies
2) Decision making upon critical evalution of data and information available
3) Group working
4) Individual working
5) Working in an international and multidisciplinary environment
6) Production of novel research ideas
7) Respect to environment and strengthening of environmental awareness
8) liberal, constructive and inductive thinking

(3) COURSE CONTENT

This course will focus on the use of natural systems of low technological and construction requirements and of low cost for the treatment of wastewaters. Special attention will be given to systems based on natural and biological processes for the treatment of wastewaters like lakes, anaerobic reservoirs and constructed wetlands

1. Introduction in Ecological Engineering Εισαγωγή στην Οικολογική Μηχανική
2. Wetland systems: Fundamentals, basic applications and parameters which affect their operation
3. Constructed wetlands of surface flow
4. Constructed wetlands of underground flow
5. Evapotranspiration of wetlands
6. Microbial processes in constructed wetlands
7. Wetlands of vertical flow
8. Application of constructed wetlands – cases studies
9. Stabilization ponds
10. Maturation ponds
11. Biobes – Fundamentals and applications

(4) TEACHING METHODS-ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>In-class lecturing, face to face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>Use of power point presentations
Email communication with students
Upload of literature, examination papers and teaching material through e-class</td></tr>
<tr><td>COURSE DESIGN
Description of teaching techniques, practices and methods:
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.

The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</td><td>
<table>
<tr><th>Activity/Method</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Theory study</td><td>35</td></tr>
<tr><td>Essay writing and presentation</td><td>25</td></tr>
<tr><td>Course total
(25 hours of workload per credit unit)</td><td>125</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc.

Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.</td><td>Students performance evaluation
• Through written exams at the end of the semester 80% of the final grade
• Presentation of a case study by groups of students 20% of final grade</td></tr>
</table>

(5) SUGGESTED BIBLIOGRAPHY:

-Suggested bibliography

- Tsichritzis BA Ecological Engineering and Technology, Volume 2: Physical Methods in Wastewater Treatment University Publication, Democritus University of Thrace.
- Crites R.W. Joe Middlebrooks E., Bastian R.K. and Reed S.C., «Natural Wastewater Treatment Systems», 2nd Edition, Taylor & Francis Group, Boca Raton, USA. ISBN 978-1-4665-8327-6.

-Complementary bibliography

Lecture notes: presentations of the lectures are available in the e-class platform for all students to download