

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	SCHOOL OF ENGINEERING		
<b>DEPARTMENT</b>	ENVIRONMENTAL ENGINEERING		
<b>LEVEL OF STUDIES</b>	FIRST CYCLE, GENERAL EDUCATION		
<b>COURSE CODE</b>	Z4YΠ	<b>SEMESTER</b>	6 <sup>th</sup>
<b>COURSE TITLE</b>	ECOLOGICAL ENGINEERING AND TECHNOLOGY I		
<b>TEACHING ACTIVITIES</b> <i>If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.</i>	<b>TEACHING HOURS PER WEEK</b>	<b>ECTS CREDITS</b>	
	4	5	
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
<b>COURSE TYPE</b> <i>Background, General Knowledge, Scientific Area, Skill Development</i>	BACKGROUND, SCIENTIFIC AREA		
<b>PREREQUISITES:</b>	Mathematics, Engineering Hydrology, Wastewater Management and Treatment Technologies I		
<b>TEACHING &amp; EXAMINATION LANGUAGE:</b>	GREEK		
<b>COURSE OFFERED TO ERASMUS STUDENTS:</b>	NO		
<b>COURSE URL:</b>	<a href="https://eclass.duth.gr/modules/document/?course=TMC218">https://eclass.duth.gr/modules/document/?course=TMC218</a>		

### 2. LEARNING OUTCOMES

<b>Learning Outcomes</b> <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i>
<p>A) Knowledge-based</p> <ul style="list-style-type: none"> <li>• Student introduction to the ecological engineering processes,</li> <li>• Comprehending the processes of pollutants production in urban runoff.</li> <li>• Understanding the functions of best management practices (BMP) of urban runoff.</li> <li>• Understanding methods for selecting appropriate BMPs.</li> </ul> <p>B) Skills/Competences acquired</p> <ul style="list-style-type: none"> <li>• Capacity to estimate the pollutant loads and water volume in urban runoff.</li> <li>• Capacity to design facilities that increase filtration of urban runoff (porous pavements, filtration trenches etc).</li> <li>• Capacity to design oil/grease separators, water quality wells.</li> <li>• Capacity to design ponds (in series and in parallel) for surficial retention/storage of urban runoff.</li> <li>• Capacity to design ponds for quality control of urban runoff.</li> <li>• Ability of using multi-criteria analysis for the selection of appropriate BMP.</li> </ul>
<p><b>General Skills</b> <i>Name the desirable general skills upon successful completion of the module</i></p> <p><i>Search, analysis and synthesis of data and information,      Project design and management</i> <i>ICT Use      Equity and Inclusion</i></p>

<i>Adaptation to new situations</i> <i>Decision making</i> <i>Autonomous work</i> <i>Teamwork</i> <i>Working in an international environment</i> <i>Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Respect for the natural environment</i> <i>Sustainability</i> <i>Demonstration of social, professional and moral responsibility and sensitivity to gender issues</i> <i>Critical thinking</i> <i>Promoting free, creative and inductive reasoning</i>
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Autonomous work Teamwork Respect for the natural environment Project design and management Working in an interdisciplinary environment
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### 3. COURSE CONTENT

1. The Science of Ecological Engineering, Definitions. Description of urban areas pollution. Production processes, type and sources of urban runoff pollutants.
2. Quality runoff and pollutant loads estimation methods. Estimation of the pollutant accumulation on the road. Estimation of the accumulated pollutants flushing by the rain.
3. Best Management Practices (BMPs) to control the urban runoff pollution. Source control measures: roads and impervious surfaces cleaning, pervious surfaces control.
4. Filtration constructions: porous pavements, infiltration trenches, wells sewage with filtration, filters.
5. Increase surficial retention: storage on roofs and terraces.
6. Grass filters. Environmental corridors.
7. Before entering the sewer control: oil/grease separators, sewers water quality, screens.
8. Control into the sewer or the channel: channel bed stabilization methods. Storage, retention into the sewer or the channel.
9. Flood control ponds (in series and in parallel).
10. Quality control ponds: first-flush infiltration, extended dry pond, wet pond, wetlands.
11. Detention ponds (in series and in parallel) for combined sewer system.
12. Runoff treatment: sand filters, biological treatment processes, disinfection.
13. Multi-criteria analysis for the selection of the best management practices (BMPs).

### 4. LEARNING & TEACHING METHODS - EVALUATION

<b>TEACHING METHOD</b> <i>Face to face, Distance learning, etc.</i>	Face to face  Classroom lectures using power-point overheads (uploaded in e-class) and blackboard-solved exercises. A book is distributed containing the theoretical part of the course and solved examples and exercises.	
<b>USE OF INFORMATION &amp; COMMUNICATIONS TECHNOLOGY (ICT)</b> <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i>	Use of ICT in teaching and in communication with students.	
<b>TEACHING ORGANIZATION</b> <i>The ways and methods of teaching are described in detail.</i>	<b>Activity</b>	<b>Workload/semester</b>
	Lectures	52

<p>Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research &amp; analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.</p> <p>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</p>	Exercises	28
	Bibliographic research & analysis	35
	Individual semester Project	30
	Project presentation	5
		<b>150</b>
<p><b>STUDENT EVALUATION</b></p> <p>Description of the evaluation process</p> <p>Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others</p> <p>Please indicate all relevant information about the course assessment and how students are informed</p>	<p>Assessment Language: Greek</p> <p>Short Answer Questions and Problem Solving (final written exam) 60%</p> <p>Mid-term examination (progress) 20%</p> <p>Semester project (individual) 20%</p>	

## 5. SUGGESTED BIBLIOGRAPHY

1. Ecological Engineering and Technology, Vol. I: Management of runoff, pollutant and sediments", Vassilios A. Tsihrintzis, University Press Book.
2. Novotny V., and Olem H., (1994), «Water Quality – prevention, Identification, and management of Diffuse Pollution», Van Nostrand Reinhold, New York, USA.
3. City of Seattle, Washington, (1989), «Water Quality, Best Management Practices Manual».
4. Galli J., (1990), «Peat-sand Filters: A Proposed Stormwater Management Practice for Urban Areas», Department of Environmental Programs, Metropolitan Washington Council of Governments, Washington, D.C.
5. Schuler T.R., (1987), Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs, Washington Metropolitan Water Resources Planning Board.
6. Wanielista M., Kersten R., Eaglin R., (1997), «Hydrology: Water Quantity and Quality Control», John Wiley & Sons, New York.

## ANNEX OF THE COURSE OUTLINE

### Alternative ways of examining a course in emergency situations

<b>Teacher (full name):</b>	GEORGIOS D. GIKAS
<b>Contact details:</b>	ggkikas@env.duth.gr
<b>Supervisors: (1)</b>	YES
<b>Evaluation methods: (2)</b>	Written examination with distance learning methods, ensuring the integrity and reliability of the examination.
<b>Implementation Instructions: (3)</b>	

(1) Please write YES or NO

(2) Note down the evaluation methods used by the teacher, e.g.

- *written assignment* or/and exercises
- written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(3) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises**: the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and **any other necessary information**.

b) in case of **oral examination with distance learning methods**: the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.