

## 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>	15HE2N - K2	<b>SEMESTER</b>	8 <sup>th</sup>
<b>COURSE TITLE</b>	ENVIRONMENTAL MANAGEMENT OF INLAND AND COASTAL SYSTEMS		
<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>	
	3	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>	SCIENTIFIC AREA SKILL DEVELOPMENT		
<b>PREREQUISITES:</b>	Engineering Hydrology, Physical Oceanography, Fluid Mechanics Aquatic Chemistry.		
<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=TMC155">https://eclass.duth.gr/modules/document/?course=TMC155</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 environmental management processes.</li> <li>• Understanding the physical and chemical processes taking place in aquatic systems.</li> <li>• Presentation of European and National legislation regarding inland and coastal aquatic systems.</li> </ul> <p>B) Skills/Competences acquired</p> <ul style="list-style-type: none"> <li>• Capacity to classify aquatic systems according to their trophic status.</li> <li>• Ability to design measures to prevent pollution and restore polluted aquatic systems.</li> <li>• Capacity to develop numerical models and implement management scenarios.</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, ICT Use</i> <i>Adaptation to new situations</i> <i>Decision making</i> <i>Autonomous work</i> <i>Teamwork</i> <i>Working in an international environment</i></p> <p><i>Project design and management</i> <i>Equity and Inclusion</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></p>

*Working in an interdisciplinary environment  
Production of new research ideas*

*Promoting free, creative and inductive reasoning*

Autonomous work  
Teamwork  
Respect for the natural environment  
Project design and management  
Working in an interdisciplinary environment

### 3. COURSE CONTENT

1. Introduction, useful definitions, environmental management.
2. Inland Waters and Coastal Zone Legislation.
3. Pollution sources and classification.
4. Mass (water and nutrients) and oxygen budget in aquatic systems. Basic limnologic principles, thermal stratification, solar radiation intrusion.
5. Nitrogen and Phosphorus cycling in aquatic systems, N:P ratio.
6. Eutrophication, systems classification based on trophic conditions, eutrophication treatment measures.
7. Water quality models: the SWAT model.
8. WASP model.
9. QUAL2E model.
10. Coastal zone and coastal systems.
11. Coastal zone erosion.
12. Pollution of the marine environment, pollution by heavy metals.
13. Management of the coastal zone.

### 4. LEARNING & TEACHING METHODS - EVALUATION

<p><b>TEACHING METHOD</b> <i>Face to face, Distance learning, etc.</i></p>	<p>Face to face</p> <p>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.</p>																	
<p><b>USE OF INFORMATION &amp; COMMUNICATIONS TECHNOLOGY (ICT)</b> <i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i></p>	<p>Use of ICT in teaching and in communication with students.</p>																	
<p><b>TEACHING ORGANIZATION</b> <i>The ways and methods of teaching are described in detail. 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.</i></p> <p><i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i></p>	<table border="1"> <thead> <tr> <th><i>Activity</i></th> <th><i>Workload/semester</i></th> </tr> </thead> <tbody> <tr> <td>Lectures</td> <td>39</td> </tr> <tr> <td>Exercises</td> <td>21</td> </tr> <tr> <td>Bibliographic research &amp; analysis</td> <td>50</td> </tr> <tr> <td>Individual semester Project</td> <td>35</td> </tr> <tr> <td>Project presentation</td> <td>5</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td><b>150</b></td> </tr> </tbody> </table>	<i>Activity</i>	<i>Workload/semester</i>	Lectures	39	Exercises	21	Bibliographic research & analysis	50	Individual semester Project	35	Project presentation	5				<b>150</b>	
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	<b>150</b>																	
<p><b>STUDENT EVALUATION</b> <i>Description of the evaluation process</i></p> <p><i>Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test,</i></p>	<p>Assessment Language: Greek</p> <p>Short Answer Questions and Problem Solving (final written exam) 70%</p>																	

*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*

Semester project (individual) 30%

*Please indicate all relevant information about the course assessment and how students are informed*

## 5. SUGGESTED BIBLIOGRAPHY

1. Antonopoulos, V. Z. 2010. «Environmental Hydraulics and Surface Water Quality», Eds. A. TZIOLA (in Greek).
2. Poulos S. and Karditsa A., 2020. "Applied Environmental Oceanography: An Introduction to Coastal Zone Management", Eds. Disigma (in Greek).
3. Chapra S.C., 1997, «Surface Water – Quality Modeling». McGraw-Hill Book Company, New York.
4. Eutrophication, 1982. «Eutrophication of waters, monitoring, assessment and control», Organization of Economic Co-operation and Development, Paris, France.
5. Alder, J., 2003: Distribution of estuaries worldwide. Sea Around Us Project, UBC, Vancouver, B.C. (Canada).
6. Allee, R., M. Dethier, B. Brown, L. Deegan, R.G. Ford, et al. 2000: Marine and Estuarine Ecosystem and Habitat Classification. NOAA Technical Memorandum NMFS-F/SPO-43, Silver Spring, MD (USA).
7. Beman J.M., K.R. Arrigo, and P.A. Matson, 2005: Agricultural runoff fuels large phytoplankton blooms in vulnerable areas of the ocean. Nature, 434:211–214.
8. Burke, L., Y. Kura, K. Kassem, C. Ravenga, M. Spalding, and D. McAllister, 2001: Pilot Assessment of Global Ecosystems: Coastal Ecosystems. World Resources Institute (WRI), Washington, D.C. (USA), 94 pp.

## 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.