

## COURSE OUTLINE

### 1. GENERAL

<b>SCHOOL</b>	Agricultural and Forestry Sciences		
<b>DEPARTMENT</b>	DEPARTMENT OF FORESTRY AND MANAGEMENT OF THE ENVIRONMENT AND NATURAL RESOURCES		
<b>LEVEL OF STUDIES</b>	LEVEL 7		
<b>COURSE CODE</b>	<b>ΔΣΠΜΣΠΣΠΕΒΕ1</b>	<b>SEMESTER</b>	<b>Spring 2<sup>nd</sup></b>
<b>COURSE TITLE</b>	Sustainable Management of Mountainous Watersheds		
<b>TEACHING ACTIVITIES</b>		<b>TEACHING HOURS PER WEEK</b>	<b>ECTS CREDITS</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>		2.3	7.5
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
<b>COURSE TYPE</b>	Scientific Area		
<i>Background, General Knowledge, Scientific Area, Skill Development</i>			
<b>PREREQUISITES:</b>	NO		
<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/courses/1425302/">https://eclass.duth.gr/courses/1425302/</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>The course's main objective is to strengthen the knowledge of the students consenting to sustainable management of mountain watersheds. Specifically, the course aims to provide a theoretical background for water resources management and their availability, investigate the effects of land use changes on water resources management, estimation of water availability, and explore water system management.</p> <p>With the completion of the individual modules, the expected learning outcomes are summarized as follows:</p> <ul style="list-style-type: none"> <li>• Students' familiarization with the River Basin Management Plans.</li> <li>• Understanding of the basic parameters involved in water resources management.</li> <li>• Ability to implement a water balance analysis and use water balance models.</li> <li>• Ability to estimate net irrigation water requirement (NIR) using different irrigation methods and crop alteration scenarios.</li> <li>• Understanding of terms such as sustainable water resources management.</li> </ul>	
<b>General Skills</b> <i>Name the desirable general skills upon successful completion of the module</i>	
<i>Search, analysis and synthesis of data and information, ICT Use Adaptation to new situations Decision making Autonomous work</i>	<i>Project design and management Equity and Inclusion Respect for the natural environment Sustainability Demonstration of social, professional and moral responsibility and</i>

<i>Teamwork</i>	<i>sensitivity to gender issues</i>
<i>Working in an international environment</i>	<i>Critical thinking</i>
<i>Working in an interdisciplinary environment</i>	<i>Promoting free, creative and inductive reasoning</i>
<i>Production of new research ideas</i>	

Search, analysis and synthesis of data and information, ICT Use  
Autonomous work  
Working in an interdisciplinary environment  
Promoting free, creative and inductive reasoning  
Decision making  
Project design and management  
Respect for the natural environment

### 3. COURSE CONTENT

1. Definitions and main components of water resources management.
2. Effects of land use changes in water resources management.
3. Water resources availability.
4. Estimation of available groundwater and surface water supply.
5. Combined surface water and groundwater management.
6. Integrated river basin management.
7. Economic development scenarios evaluation
8. Management techniques – mathematical programming techniques.
9. Operational management of water system and infrastructure
10. Optimum reservoir operation
11. Dealing with extreme events - Flood and drought management
12. Water resources development projects and Impact assessment.
13. Water resources at supra-national level. Transnational cooperation and dispute resolution mechanisms. Examples of water resource management in developed, developing, and semi-developed countries. Applications - case studies.

### 4. LEARNING & TEACHING METHODS - EVALUATION

<b>TEACHING METHOD</b> <i>Face to face, Distance learning, etc.</i>	Face to face and Distance learning	
<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, in Communication with students and in the evaluation of the students	
<b>TEACHING ORGANIZATION</b> <i>The ways and methods of teaching are described in detail.</i> <i>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>  <i>The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.</i>	<b>Activity</b>	<b>Workload/semester</b>
	Lectures	30
	Bibliographic research & analysis	15
	Individual perusal	35
	Laboratory Exercise	42.5
	Written Assignment	65
	Total	<b>187.5</b>
<b>STUDENT EVALUATION</b> <i>Description of the evaluation process</i>  <i>Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam,</i>	Written Assignment - Laboratory Exercise (70%) Personal assignment presentation - Oral Exam (30%)	

*Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others*

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

## 5. SUGGESTED BIBLIOGRAPHY

1. Ψιλοβίκος, Α. ΥΔΑΤΙΚΟΙ ΠΟΡΟΙ. Θεσσαλονίκη: Εκδόσεις Τζιόλα, ISBN: 978-960-418-602-0, 2020.
2. Κουτσογιάννης, Δ., Σημειώσεις Διαχείρισης Υδατικών Πόρων - Μέρος 1, Τομέας Υδατικών Πόρων, Υδραυλικών και Θαλάσσιων Έργων – Εθνικό Μετσόβιο Πολυτεχνείο, 2007.
3. Ευστρατιάδης, Α., Ν. Μαμάσης, και Δ. Κουτσογιάννης, Σημειώσεις Διαχείρισης Υδατικών Πόρων - Μέρος 2, Τομέας Υδατικών Πόρων, Υδραυλικών και Θαλάσσιων Έργων – Εθνικό Μετσόβιο Πολυτεχνείο, 2007.
4. Loucks, D.P., E. van Beek, J.R. Stedinger, J.P.M. Dijkman, Water Resources Systems Planning and Management, An Introduction to Methods, Models and Applications, Studies and Reports in Hydrology, UNESCO Publishing, 680 pages, Paris, 2005.
5. Mays, L. W., and Y.-K. Tung, Hydrosystems Engineering and Management, McGraw-Hill, New York, 1992.
6. Grigg, N. S., Water Resources Management, McGraw-Hill, New York, 1996.
7. Jain, S.K. and Singh, V.P. Water resources systems planning and management. Elsevier, Amsterdam, 2003.
8. Kolokytha, E., Oishi, S., & Teegavarapu, R. S. V. Sustainable Water Resources Planning and Management Under Climate Change (E. Kolokytha, S. Oishi, & R. S. V. Teegavarapu, Eds.). Springer Singapore. 2017. <https://doi.org/10.1007/978-981-10-2051-3>

## ANNEX OF THE COURSE OUTLINE

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

<b>Teacher (full name):</b>	George Papaioannou
<b>Contact details:</b>	gpapaio@fmenr.duth.gr
<b>Supervisors: (1)</b>	YES
<b>Evaluation methods: (2)</b>	Oral examination using face to face or distance examination techniques / Written Assignment / Exercises
<b>Implementation Instructions: (3)</b>	<p>1. During the personal assignment presentation, each student's oral examination will be based on the assignment topic. If the face-to-face examination cannot be followed, the oral examination will be implemented using Microsoft Teams. All students will be informed about the link of the distance examination through e-class. Thus, all students should have registered to the corresponding course using their institutional accounts. All students should have been informed about the distance education terms.</p> <p>Students must log into the digital exam room only through their institutional account. During the examination process, all students should have their cameras on. At the beginning of the examination, all students must show their academic ID to the camera for identification purposes.</p>

	2. The course examination will be implemented using personal written assignments and exercises. The exercises-assignments will be uploaded to the e-class platform. All necessary data for the assignments will be presented at the section “Exercises” of the corresponding course.
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(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.