

COURSE OUTLINE

1. GENERAL

SCHOOL	ENGINEERING		
DEPARTMENT	ENVIRONMENTAL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΟΕΑ1ΕΠ	SEMESTER	8
COURSE TITLE	WATER RESOURCES MANAGEMENT		
TEACHING ACTIVITIES <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>	TEACHING HOURS PER WEEK	ECTS CREDITS	
	4	5	
<i>Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.</i>			
COURSE TYPE <i>Background, General Knowledge, Scientific Area, Skill Development</i>	BACKGROUND		
PREREQUISITES:	NO		
TEACHING & EXAMINATION LANGUAGE:	GREEK AND ENGLISH FOR ERASMUS STUDENTS		
COURSE OFFERED TO ERASMUS STUDENTS:	YES		
COURSE URL:			

2. LEARNING OUTCOMES

<p>Learning Outcomes <i>Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.</i></p>
<p>A) Knowledge-based</p> <p>The course aims at providing knowledge and tools that are used by engineers in water resources planning and management. The course should provide a general overview of the current state of water resources and the challenges faced today and in the future. The course covers methods of quantitative, and methods of management and decision-making. Quantitative analysis techniques include mathematical and statistical methods, and deterministic models, spatial analysis and modeling, and optimization and simulation methods. Knowledge of the methods used to assess the water resources and anthropogenic impacts on water. Examination of the basic principles of surface and ground water resources management in the context of increasing water scarcity and uncertainty due to the stress of the system. Knowledge of specific topics including reservoir, river basin and aquifer management, conjunctive use of surface and ground water, and treated wastewater reuse. Besides the technical aspects of water management, an overview of its legal and institutional framework is provided.</p>
<p>B) Skills/Competences acquired</p> <p>After completing this course, students will be able:</p>

- To combine options to emerge with skills varying from integrated water management, surface and groundwater hydrology, to administration and leadership skills relevant to the sector.
- To apply management fundamentals to solve current problems and to anticipate, mitigate and prevent future problems in the area of water resources management.
- To recognize and appreciate social, political, economic and environmental impacts on water resources management
- To develop skills in methods and techniques relevant to integrated water resources management
- To explain the concept and principles of IWRM. Describe the methodologies and tools for practicing IWRM. Analyze the EU WFD as an example of IWRM in practice
- To analyze policy and planning frameworks for water resources management
- To identify and critically review the conflicting interests to be considered in making water resource management decisions
- To fully contribute to projects and issues in integrated water resource management
- To characterize, quantify and manage water resources

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information,
ICT Use

Adaptation to new situations

Decision making

Autonomous work

Teamwork

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project design and management

Equity and Inclusion

Respect for the natural environment

Sustainability

Demonstration of social, professional and moral responsibility and sensitivity to gender issues

Critical thinking

Promoting free, creative and inductive reasoning

ICT use; Decision-making; Project design and management; critical thinking; autonomous work

3. COURSE CONTENT

This course introduces the student to the basic principles of Water Resources Management (WRM). The lectures are the following:

1. Introduction in WRM
2. Water resources systems
3. Economics of WRM
4. Numerical modelling in WRM
5. Simulating the water systems
6. Optimization
7. Decision making and multi-criteria analysis
8. Uncertainties in WRM
9. Machine Learning in WRM
10. Natural hazards: floods
11. Natural hazards: drought
12. WRM software presentation
13. Final course

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD

Face to face, Distance learning, etc.

Classroom lectures in using power-point overheads (uploaded in e-class) and blackboard-solved exercises.

	Personal course notes and weekly assignments are regularly updated on the e-class platform.																		
<p>USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT)</p> <p><i>Use of ICT in Teaching, in Laboratory Education, in Communication with students</i></p>	Teaching algorithms and exercises for solving WRM problems using Excel.																		
<p>TEACHING ORGANIZATION</p> <p><i>The ways and methods of teaching are described in detail.</i></p> <p><i>Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & 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>35</td> </tr> <tr> <td>Exercises</td> <td>17</td> </tr> <tr> <td>Semester project</td> <td>30</td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table>	<i>Activity</i>	<i>Workload/semester</i>	Lectures	35	Exercises	17	Semester project	30										
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<p>STUDENT EVALUATION</p> <p><i>Description of the evaluation process</i></p> <p><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, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others</i></p> <p><i>Please indicate all relevant information about the course assessment and how students are informed</i></p>	Course evaluation is based on the final written exam. The assessment Language is Greek/English (for Erasmus students) and the form of the exams is engineering problems to be solved.																		

5. SUGGESTED BIBLIOGRAPHY

1. Loucks, D. and van Beek, E. (2017). Water Resource Systems Planning and Management, Springer.
2. Ojha, C.S.P., Surampalli, R.Y., Bardossy, A., Zhang, T.C., Kao, C.M. (2017). Sustainable Water Resources Management, American Society of Civil Engineers.

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	
Contact details:	
Supervisors: (1)	
Evaluation methods: (2)	
Implementation Instructions: (3)	

- (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.