

COURSE OUTLINE “WATER RESOURCES MANAGEMENT”

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	POSTGRADUATE		
COURSE CODE	662001	SEMESTER	2 nd
COURSE TITLE	WATER RESOURCES MANAGEMENT (WRM)		
INDEPENDENT TEACHING ACTIVITIES <i>if credits are awarded for separate components of the course, e.g. lectures, laboratory exercises, etc. If the credits are awarded for the whole of the course, give the weekly teaching hours and the total credits</i>		WEEKLY TEACHING HOURS	ECTS Credits
Lectures		3	6
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Scientific Area		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO		
COURSE WEBSITE (URL)	http://www.environmentalprotection.gr/?page_id=152		

(2) LEARNING OUTCOMES

<p>Learning outcomes</p> <p><i>The course learning outcomes, specific knowledge, skills and competences of an appropriate level, which the students will acquire with the successful completion of the course are described.</i></p> <p><i>Consult Appendix A</i></p> <ul style="list-style-type: none"> • <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i> • <i>Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i> • <i>Guidelines for writing Learning Outcomes</i>
<p>Upon completion of the course, students will have an in-depth knowledge and critical understanding of:</p> <ul style="list-style-type: none"> ▪ The scope, basic principles and objectives of sustainable WRM, in general. ▪ The constraints, difficulties, specificities and objectives of WRM in Greece, in particular. ▪ Important WRM issues in Greece related to water allocation and use in competing sectors, such as irrigated agriculture, hydropower generation, urban water supply etc. ▪ The EU environmental policy for the protection of water bodies and water resources of member states, as specified in the various directives related to water issues. <p>Students will also be well-informed about:</p> <ul style="list-style-type: none"> ▪ Water policy makers at regional and national level in Greece, as well as the public entities responsible for the implementation of water policies.

- Progress made and necessary measures for the implementation of the EU directives related to water issues in Greece.

Students will be able to:

- Participate in consulting teams or working groups, which are tasked with preparing management plans for specific drainage basins or wider areas, and identifying the necessary measures for the protection and sustainable management of the water bodies and water resources of these regions, in accordance with the requirements of relevant European directives.
- Participate in consulting teams, which draw up Environmental Impact Assessment (EIA) or Preliminary Environmental Assessment studies, focusing on the impacts of proposed projects and/or activities to the water bodies and water balance of a region.
- Develop (and/or coordinate) applied research programs on topics related to the protection and management of water resources.

Students will be also able to:

- Assess the water balance modeling of a basin or a water district, or the water balance of a reservoir, based on measurements or estimates of the hydrologic equation terms.
- Suggest ways of managing water in a river basin or a reservoir to meet specific needs, while satisfying environmental commitments (e.g. using only renewable groundwater resources, or maintaining adequate ecological flows downstream of a dam, etc.).
- Evaluate programs of measures specified in the management plans for the water resources of a catchment or a wider area, which are required under the Water Framework Directive 2000/60, as well as other necessary measures and actions required by other relevant Directives, which are also taught in this course.
- Participate in committees and working groups focusing on the protection and management of water bodies and water resources, and formulating proposals and legal instruments concerning water policy at national, regional and local level.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplement and appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology

Adapting to new situations

Decision-making

Working independently

Team work

Working in an international environment

Working in an interdisciplinary environment

Production of new research ideas

Project planning and management

Respect for difference and multiculturalism

Respect for the natural environment

Showing social, professional and ethical responsibility and sensitivity to gender issues

Criticism and self-criticism

Production of free, creative and inductive thinking

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Others...

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Working independently
- Team work
- Working in an interdisciplinary environment
- Project planning and management
- Respect for the natural environment
- Political / legal, economic and social considerations in decision-making

(3) COURSE CONTENT

1. Introduction to WRM

- Basic concepts: WRM definitions and scope, water uses, WRM objectives.
- Brief Description of WRM tools: hydrosystems, hydrosystem simulation, reservoir operation modeling, methods for solving water allocation problems.

2. WRM in Greece –Specificities – Current status

- Specificities of WRM in Greece: Spatio – temporal distribution of rainfall and water use and demand, water districts and main river basins, transboundary water resources, water supply and demand balance.
- Water management in agriculture – hydropower generation – urban water systems and demand management.
- National Plan for Water Resources Management and Protection: a brief presentation.

3. Environmental aspects of WRM – EU Environmental Policy and Legislation regarding Water Bodies and Water.

- Introduction.
- Brief presentation of EU directives related to water issues.

4. Water Framework Directive (WFD) 2000/60-1

- Key points and objectives of the Directive.
- WFD implementation in Greece.

5. Water Framework Directive (WFD) 2000/60-2

- Water management plans for the country's 14 water districts: Key points, objectives, and stages of implementation.
- Review of the water management plan of a selected water district.

6. The Groundwater Directive (2006/118)-The Priority Substances Directive (2008/105)

- Key points of the Directives.
- Implementation of the Directives in Greece.

7. The Nitrates Directive 91/676

- Key points of the Directive.
- Implementation of the Directive in Greece.
- Nitrate Vulnerable Zones.
- Common Agricultural Policy-Agri-environment measures.

8. The Cases of Asopos River and Lake Koroneia

- Asopos River: Main causes of pollution, technical and administrative efforts to address the problem.
- Lake Koroneia: causes of environmental degradation, technical and administrative efforts to address the problem.

9. The Floods Directive 2007/60

- Key points of the Directive - Links between the Flood Directive and the WFD.
- Implementation of the Directive in Greece.
- Entities responsible for flood protection – The “Xenokratis” Plan.

<p>10. The New Bathing Water Directive 2006/7</p> <ul style="list-style-type: none"> • Key points of the Directive. • Implementation of the Directive in Greece. <p>11. The Marine Strategy Framework Directive 2008/56</p> <ul style="list-style-type: none"> • Key points of the Directive. • Implementation of the Directive in Greece. <p>12. Course summary, review – Term paper presentations</p>
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(4) TEACHING & LEARNING METHODS – EVALUATION

<p>DELIVERY <i>Face-to-face, Distance learning, etc.</i></p>	Face-to-face, distance learning	
<p>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i></p>	<ul style="list-style-type: none"> • Access to data bases and special coding software for search and management of information using ICT. • Communication and electronic submission of assignments and term papers. • Support of teaching through the website. • Presentations in PP, video and linking with specialized websites through the internet. 	
<p>TEACHING METHODS <i>The manner and methods of teaching are described in detail.</i> <i>Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.</i></p> <p><i>The student's study hours for each learning activity are given as well as the hours of non-directed study according to the principles of the ECTS</i></p>	<p>Activity</p>	<p>Semester workload</p>
	Lectures	39
	Study and analysis of bibliography	39
	Educational visits	12
	Short assignments (problem solving)	10
	Term paper (team work)	50
	Course total	150
<p>STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>Language of evaluation, methods of evaluation, summative or conclusive, multiple choice questionnaires, short-answer questions, open-ended questions, problem solving, written work, essay/report, oral examination, public presentation, laboratory work, clinical examination of patient, art interpretation, other</i></p> <p><i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i></p>	Final exam (<i>multiple choice questionnaires+ problem solving</i>)	50%
	Short assignments (problem solving)	10%
	Term paper	30%
	Public Presentation	10%

(5) ATTACHED BIBLIOGRAPHY

- Hornberger M. George, Raffensperger P. Jeffrey κ.α. (Επιμ: Καραλής Σωτήρης), «Στοιχεία Φυσικής Υδρολογίας», Εκδόσεις Ίων, 2015.
- Μιμίκου, Μ., Μπαλτάς. Ε., «Τεχνική Υδρολογία», Εκδόσεις ΠΑΠΑΣΩΤΗΡΙΟΥ, 2012.
- Τσακίρης Γ., «ΥΔΡΑΥΛΙΚΑ ΕΡΓΑ Σχεδιασμός & Διαχείριση, ΤΟΜΟΣ Ι: Αστικά Υδραυλικά Έργα», Εκδόσεις Συμμετρία, Αθήνα, 2010.
- Μιμίκου, Μαρία Α., «Τεχνολογία Υδατικών Πόρων», Εκδόσεις ΠΑΠΑΣΩΤΗΡΙΟΥ, 2006.
- Βουδούρης, Κ., «ΤΕΧΝΙΚΗ ΥΔΡΟΓΕΩΛΟΓΙΑ Υπόγεια Νερά», Εκδόσεις Τζιόλα, 2013.
- Βουδούρης, Κ., «Εκμετάλλευση και διαχείριση υπόγειου νερού», Εκδόσεις Τζιόλα, 2015.
- Βουδούρης, Κ., «Υδρογεωλογία Περιβάλλοντος – Υπόγεια Νερά και Περιβάλλον», Εκδόσεις Τζιόλα, 2009.