

## 1.1.1 Underground Hydraulic and Hydrology

### GENERAL

<b>SCHOOL</b>	Engineering		
<b>ACADEMIC UNIT</b>	CIVIL ENGINEERING		
<b>LEVEL OF STUDIES</b>	Undergraduate		
<b>COURSE CODE</b>	YΔP005	<b>SEMESTER</b>	6th
<b>COURSE TITLE</b>	Underground Hydraulic and Hydrology		
<b>INDEPENDENT TEACHING ACTIVITIES</b> <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>	<b>WEEKLY TEACHING HOURS</b>	<b>CREDITS</b>	
	4	4	
<i>Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).</i>			
<b>COURSE TYPE</b> <i>general background, special background, specialised general knowledge, skills development</i>	Scientific Background		
<b>PREREQUISITE COURSES:</b>			
<b>LANGUAGE OF INSTRUCTION and EXAMINATIONS:</b>	Greek		
<b>IS THE COURSE OFFERED TO ERASMUS STUDENTS</b>	No		
<b>COURSE WEBSITE (URL)</b>			

### LEARNING OUTCOMES

<p><b>Learning outcomes</b></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"> <li>• <i>Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area</i></li> <li>• <i>Descriptors for Levels 6, 7 &amp; 8 of the European Qualifications Framework for Lifelong Learning and Appendix B</i></li> <li>• <i>Guidelines for writing Learning Outcomes</i></li> </ul>										
<p>The successful completion of the course will enable students to: - Clarify the laws of hydraulics linked with the saturated water flow in the ground; - Interpret the hydrological cycle and natural hydrological processes; - Define the spatial and temporal rainfall distribution at catchments' scale; - Analyze groundwater flows towards ditches and wells from confined and unconfined aquifers; - Apply approximate solutions for flow in saturated porous medium; - Evaluate the required technical works required for hydrological studies' development.</p>										
<p><b>General Competences</b></p> <p><i>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?</i></p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i></td> <td style="width: 50%; border: none;"><i>Project planning and management</i></td> </tr> <tr> <td style="border: none;"><i>Adapting to new situations</i></td> <td style="border: none;"><i>Respect for difference and multiculturalism</i></td> </tr> <tr> <td style="border: none;"><i>Decision-making</i></td> <td style="border: none;"><i>Respect for the natural environment</i></td> </tr> <tr> <td style="border: none;"><i>Working independently</i></td> <td style="border: none;"><i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i></td> </tr> <tr> <td style="border: none;"><i>Team work</i></td> <td style="border: none;"><i>Criticism and self-criticism</i></td> </tr> </table>	<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i>	<i>Project planning and management</i>	<i>Adapting to new situations</i>	<i>Respect for difference and multiculturalism</i>	<i>Decision-making</i>	<i>Respect for the natural environment</i>	<i>Working independently</i>	<i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i>	<i>Team work</i>	<i>Criticism and self-criticism</i>
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<i>Team work</i>	<i>Criticism and self-criticism</i>									

<i>Working in an international environment</i>	<i>Production of free, creative and inductive thinking</i>
<i>Working in an interdisciplinary environment</i>	.....
<i>Production of new research ideas</i>	<i>Others...</i>
	.....

  

<ul style="list-style-type: none"> <li>-Search for, analysis and synthesis of data and information, with the use of the necessary technology</li> <li>-Adapting to new situations</li> <li>-Decision-making</li> <li>-Working independently</li> <li>-Team work</li> <li>-Working in an interdisciplinary environment</li> <li>-Project planning and management</li> <li>-Criticism and self-criticism</li> <li>-Production of free, creative and inductive thinking</li> </ul>
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## SYLLABUS

<ul style="list-style-type: none"> <li>- Basic properties and classification of aquifers and hydraulic parameters. Soil characteristics. Darcy's law. Coefficient of permeability</li> <li>- Continuity equation. The mathematical model of groundwater flows. Types of boundaries and boundary conditions</li> <li>- Confined and free surface flows towards ditches and wells</li> <li>- Systems of wells. Method of images. Seepage force and the effect of piping</li> <li>- Hydrologic cycle, hydrological processes and water balances</li> <li>- Spatial and temporal rainfall distribution at catchments' scale</li> <li>- Measurements and analysis of rainfall and stream discharges</li> <li>- Prevision of floods and droughts. Simulation of watersheds</li> <li>- Estimation of hydrologic data for engineering works</li> </ul>
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## TEACHING and LEARNING METHODS - EVALUATION

<b>DELIVERY</b> <i>Face-to-face, Distance learning, etc.</i>	Face to face.	
<b>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</b> <i>Use of ICT in teaching, laboratory education, communication with students</i>	Powerpoint presentations, e-learning platform for educational material	
<b>TEACHING METHODS</b> <i>The manner and methods of teaching are described in detail. 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>  <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>	<b>Activity</b>	<b>Semester workload</b>
	Lectures	40
	Practice/exercises	12
	Educational visit	
	Individual study	
	Course total (26 hours workload per ECTS credit)	<b>104</b>
<b>STUDENT PERFORMANCE EVALUATION</b> <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>	Formative evaluation consisted of: <ul style="list-style-type: none"> <li>- Non-compulsory intermediate essays (5 to 6 in total) (30% of final mark) focused on solving problems :</li> <li>- Final written exams (70% of final mark) consisted of:             <ul style="list-style-type: none"> <li>a) multiple choice and short answer questions on the basic theory of the course (10% of the final mark)</li> <li>b) Solving of problems/questions (60% of the final mark)</li> </ul> </li> </ul>	

<i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	
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## **ATTACHED BIBLIOGRAPHY**

- Κουτσογιάννης Δημήτριος, Ξανθόπουλος Θεμιστοκλής, Τεχνική Υδρολογία, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", ISBN: 978-960-603-506-7. Κωδικός Βιβλίου στον Εύδοξο: 59390290
- Τολίκας Δημήτρης Κ., Υπόγεια υδραυλική, Εκδόσεις Επίκεντρο, 2005 (1η έκδοση), ISBN: 978-960-88731-7-9. Κωδικός Βιβλίου στον Εύδοξο: 15196
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- Τσακίρης Γ., Υδατικοί Πόροι II: Εφαρμογές Τεχνικής Υδρολογίας, Εκδόσεις Συμμετρία, 2009 (1η έκδοση), ISBN: 978-960-266-266-3 Κωδικός Βιβλίου στον Εύδοξο: 45490
- Μπαλτάς Ευάγγελος, Μιμίκου Μαρία, Τεχνική Υδρολογία, Εκδόσεις Παπασωτηρίου, 2018 (6η έκδοση), ISBN: 978-960-491-125-7. Κωδικός Βιβλίου στον Εύδοξο: 77117411
- Μυρωνίδης Δημήτριος, Υδρολογία και Υδραυλική, Εκδόσεις ΤΖΙΟΛΑ, 2021 (1η έκδοση), ISBN: 978-960-418-884-0. Κωδικός Βιβλίου στον Εύδοξο: 94688988