8.6 CE0820 – Urban Hydraulic Works

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**CE0820**	**SEMESTER**	**8**
COURSE TITLE	**Urban Hydraulic Works**		

INDEPENDENT TEACHING ACTIVITIES *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*	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	4
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	Special Background Course
PREREQUISITE COURSES:	Fluid Mechanics (CE0430) Hydraulics (CE0520) English level B2 or higher is required for Erasmus incoming students
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (English/Erasmus)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/CIV226/

(2) LEARNING OUTCOMES

Learning outcomes

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.

Consult Appendix A

- *Description of the level of learning outcomes for each qualifications cycle, according to the Qualifications Framework of the European Higher Education Area*
- *Descriptors for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and Appendix B*
- *Guidelines for writing Learning Outcomes*

The aim of the course is to help students understand the fundamental concepts of urban water management, with the emphasis on the analysis and design of urban hydraulic works and, in particular, water supply and sewage networks.

Upon completion of the course, students will have acquired:

1. Basic knowledge of urban hydraulic works related to civil engineering.

2. In-depth knowledge and critical understanding of the fundamental theoretical concepts and practical methods in the design, installation and management of urban hydraulic works.
3. Knowledge and understanding of the difficulties often presented in sewage and pipe networks of internal and external aqueducts.

Students will also be able to:

1. Have adequate comprehension skills of recognizing the most basic urban hydraulic works.
2. Evaluate and manage their efficiency.

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	*Search for, analysis and synthesis of data and information, with the use of the necessary technology*
Adapting to new situations	*Adapting to new situations*
Decision-making	*Decision-making*
Working independently	*Working independently*
Team work	*Team work*
Working in an international environment	*Working in an international environment*
Working in an interdisciplinary environment	*Working in an interdisciplinary environment*
Production of new research ideas	*Production of new research ideas*

The course aims that the student acquires - practice the following general skills:

- Search for, analysis of, and synthesis of data and information, implementing appropriate technologies
- Decision-taking
- Independent work - Team work - Working in an international / interdisciplinary environment
- Respect natural environment - Social, professional and ethical responsibility

(3) SYLLABUS

1. Introduction to Hydraulic works. Water intake, supply and distribution systems (historical background, hydrologic and hydraulic uncertainty issues, complexity). Ripple diagram. The example of Athens' water supply system.
2. Introduction to the design of water supply systems and works at the inner and outer aqueduct (quality and quantity issues, estimation of demand and future population for the return period of the project, Construction & Engineering Law, water consumption models, water pump systems, cavitation issues, pressurized flow, technological advances in pipe networks).
3. Introduction to the design of sewage networks (quality and quantity issues, estimation of discharge, Greek legislation, free surface flow, groundwater infiltration, technological advances in pipe networks, pipeline technology, alternative drainage systems).
4. Introduction to Hydrology (catchment runoff estimation, intensity-duration-frequency curve, peak discharge, rational method).

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Face-to-face in-class teaching. When needed, distance teaching (synchronous/asynchronous)
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of I.C.T. in Teaching and Student Communication
TEACHING METHODS *The manner and methods of teaching are described in detail.*	

Activity	***Semester workload***

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. *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*		In Class (/Distance) Teaching	52
		Literature Study	35
		Exercises / Paradigms	18
		Project assignment / Essay	15
		Course total	**120**

STUDENT PERFORMANCE EVALUATION *Description of the evaluation procedure* *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* *Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	Language of evaluation: Greek (English/Erasmus) Written examination, 2,5-hours Problem solving, Multiple choice test, Questions and Answers, Written Essay / Project The evaluation criteria are announced to the students well before the examination; weights per subject /exercise are explicitly indicated. The examination results (including total / partial grading) are announced on the web. Students may require to have access to their tests, they may ask for clarifications on mistakes, grading etc.

(5) **ATTACHED BIBLIOGRAPHY**

Greek Bibliography:

1. Στοιχεία Σχεδιασμού Έργων Ύδρευσης και Αποχέτευσης [94702516], Λαγγούσης, Α., Φουρνιώτης, Ν, Εκδόσεις Gotsis. Πάτρα 2020. (In Greek)
2. Υδραυλική των Οικισμών – Υδρεύσεις, [12496], 1η εκδ./1976, G. Martz, ISBN: 960-512-008-6, Χ. ΓΚΙΟΥΡΔΑ & ΣΙΑ ΕΕ. (In Greek)
3. Παντοκράτορας Α. Υδρεύσεις Πόλεων, Εκδόσεις Επίκεντρο, 2015. (In Greek)
4. Κωτσόπουλος Σ., Υδρεύσεις, Εκδόσεις Ίων, 2014. (in Greek)
5. Τσακίρης Γ., Υδραυλικά Έργα, Σχεδιασμός και Διαχείριση, Τόμος Ι: Αστικά Υδραυλικά Έργα, Τόμος Ι, 1η
6. έκδ./2010, ISBN: 978-960-266-289-2, Σ.ΑΘΑΝΑΣΟΠΟΥΛΟΣ & ΣΙΑ Ι.Κ.Ε, 2010. (In Greek)
7. Βιβλίο [59390288]: Σχεδιασμός Αστικών Δικτύων Αποχέτευσης[Ηλεκτρονικό Βιβλίο], ΔΗΜΗΤΡΙΟΣ ΚΟΥΤΣΟΓΙΑΝΝΗΣ. (In Greek)
8. Βιβλίο [320252]: ΟΛΟΚΛΗΡΩΜΕΝΗ ΔΙΑΧΕΙΡΙΣΗ ΑΣΤΙΚΩΝ ΔΙΚΤΥΩΝ ΥΔΡΕΥΣΗΣ [Ηλεκτρονικό Βιβλίο], ΒΑΣΙΛΗΣ ΚΑΝΑΚΟΥΔΗΣ, ΣΤΑΥΡΟΥΛΑ ΤΣΙΤΣΙΦΛΗ. (In Greek)

Foreign Bibliography:

1. Chanson, H., The hydraulics of open channel flow, Elsevier, 2004.
2. Chow V.T., Open-Channel Hydraulics, McGraw Hill, 1959.
3. Chung, T.J., Computational fluid dynamics, Cambridge University Press, Cambridge, 2002.

Related academic journals:

1. Journal of Hydrology, Elsevier.
2. Journal of Hydrological Sciences, Taylor & Francis
3. Journal of Hydrology, mdpi.