8.4 CE0813 – River Hydraulics - Flood Protection Projects

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**CE0813**	**SEMESTER**	**8**
COURSE TITLE	**River Hydraulics - Flood Protection Projects**		

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**
	3	5
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*	Specialization Course
PREREQUISITE COURSES:	Hydraulics (CE0520) Open Channel Hydraulics (CE0713)
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/CIV169/

(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 for the study, design, and management of technical projects related to river hydraulics and river networks, with a focus on flood protection works and mitigation measures, with applications to flood risk management in urban and rural areas.

Upon completion of the course, students will have acquired:

1. Basic knowledge of river hydraulics.

2. In-depth knowledge and critical understanding of flood protection works.
3. Knowledge of how to run the 1D and 2D HEC-RAS hydraulic software.

Students will also be able to:

1. Perform 1D open-channel flow simulations.
2. Propose flood mitigation measures.
3. Produce a flood risk map.

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

River hydraulics focuses on the study and application of open channel hydraulics theory to natural channels, such as rivers and watercourses of various scales and degrees of channelization, in rural and urban environments. The physical mechanisms that form a natural river (such as erosion, deposition, meandering, etc.) as well as the hydraulic laws of open-channel flow (continuity equation, energy, and momentum preservation) are presented. This course also focuses on flood protection works and flood risk management and mitigation measures, such as bottom sills along alluvial channels, drainage works, levees and dams, flood retention basins, river channelization, early warning systems, etc. The 2007/60 European Floods Directive is briefly discussed, as well as the content of flood risk management plans, which are required by the Floods Directive. As an example, flood protection and mitigation measures for a particular flood event are discussed, using freeware software for the simulation of flood propagation.

(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.* *Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, placements, clinical practice, art workshop,*	

Activity	***Semester workload***
In Class (/Distance) Teaching	39

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*		Literature Study	45
		Exercises / Paradigms	36
		Project assignmenet / Essay	30
		Course total	**150**

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 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. Δερμίσης Β., Διευθετήσεις Υδατορρευμάτων, ΕΚΔΟΣΕΙΣ Α. ΤΖΙΟΛΑ & ΥΙΟΙ Α.Ε., 2010. (in Greek)
2. Τσακίρης Γ., Υδραυλικά έργα, Σχεδιασμός και Διαχείριση, Τόμος ΙΙ: Εγγειοβελτιωτικά Έργα, Εκδόσεις Συμμετρία, 2006. (In Greek)
3. Χρήστος Ε. Τσόγκας, Μηχανική των Ποταμών (2η Έκδοση), Εκδόσεις Ίων, 2004. (In Greek)
4. ΒΛΑΣΙΟΣ ΧΡΥΣΑΝΘΟΥ, ΠΟΤΑΜΙΑ ΥΔΡΑΥΛΙΚΗ ΚΑΙ ΤΕΧΝΙΚΑ ΕΡΓΑ, 1/2016, ISBN: 978-960-603-466-4, [Ηλεκτρονικό Βιβλίο, Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα – Αποθετήριο "Κάλλιπος"], 2016. (In Greek)
5. Κουτσογιάννης, Δ., και Θ. Ξανθόπουλος, Τεχνική Υδρολογία, Έκδοση 3, 418 σελ., Εθνικό Μετσόβιο Πολυτεχνείο, Αθήνα, 1999. (In Greek).

Foreign Bibliography:

1. Ramakar Jha et al. (editors), River Hydraulics (Hydraulics, Water Resources and Coastal Engineering Vol. 2), Springer, 2022.
2. Chanson, H., The hydraulics of open channel flow, Elsevier, 2004.
3. Chow V.T., Open-Channel Hydraulics, McGraw Hill, 1959.
4. Chung, T.J., Computational fluid dynamics, Cambridge University Press, Cambridge, 2002.

Related academic journals:

1. Journal of Hydrology, Elsevier.
2. Journal of Waterway, Port, Coastal, and Ocean Engineering, ASCE
3. Journal of Hydraulic Engineering, ASCE
4. Journal of Hydrological Sciences, Taylor & Francis