

COURSE OUTLINE

(1) GENERAL

SCHOOL	UNIVERSITY OF THESSALY		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΥΔ0710	SEMESTER	9th
COURSE TITLE	UNSTEADY FLOWS		
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	CREDITS
		4	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, specialized general knowledge, skills development</i>	Specialized general knowledge		
PREREQUISITE COURSES:	Fluid Mechanics Hydraulics		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)			

(2) LEARNING OUTCOMES

Learning outcomes <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> <i>Consult Appendix A</i> • <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>
Specific Knowledge Upon completing the course, the student will possess advanced knowledge that entails a critical understanding of theories and principles in: • Advanced Hydraulics • Unsteady Flow Skills Upon completing the course, the student will acquire advanced problem-solving skills for complex and unpredictable issues, including: • Water supply networks experiencing sudden flow interruptions • Open-channel systems with unsteady flow Competencies Upon completing the course, the student will be able to: • Address unsteady flow problems in closed conduits • Handle unsteady flow issues in open channels

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?

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

- Research, analysis, and synthesis of data and information, utilizing the necessary technologies
- Adaptation to new situations
- Decision-making
- Independent work
- Working in an international environment
- Project planning
- Respect for the natural environment
- Promotion of free, creative, and inductive thinking

(3) SYLLABUS**Week No. – Course contents**

- 1 - Introduction
- 2 - Unsteady flow in closed conduits
- 3 - Equations of motion-Continuity equation
- 4 - Hydraulic water-hammer
- 5 - Sudden-slow-partial flow interruption
- 6 - Flow interrupts in non-uniform channel
- 7 - Kinematic waves. Flood waves
- 8 - Bergeron's method
- 9 - Method of characteristics
- 10 - Wave propagation on flows with a free surface
- 11 - Unsteady flow in open channels
- 12 - Slowly-rapidly varied flow
- 13 - Applications-Exercises
- 14 - Special topics

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face		
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	Power-point, notes, tutorials, exercises, and announcements in e-class.		
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> <i>The student's study hours for each learning activity are given as well as</i>	<i>Activity</i>	<i>Semester workload</i>	
	Lectures	14*4=56 hours	
	Study	13*4=52 hours	
	Project	30 hours	
	Final examinations	2 hours	
	Study for exams	10 hours	
	Course total	150	

<i>the hours of non- directed study according to the principles of the ECTS</i>		
STUDENT PERFORMANCE EVALUATION Description of the evaluation procedure <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> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	Language of Evaluation Greek Methods of evaluation 50% - Final written examinations 50 % - Class project	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- Τολίκας, Δ., "Υδραυλικό Πλήγμα", Παρατηρητής, Θεσσαλονίκη, 2000
- Wylie, E. B. and Streeter, V. L. "Fluid Transients", McGraw - Hill Book Co., New York, 1978
- Watters G. Z. "Modern Analysis and Control of Unsteady Flow in Pipelines", Ann Arbor Science Publishers Inc., 1979
- Parmakian, J. "Water - Hammer analysis", Dover Publications, Inc., New York, 1963
- Bergeron, L. "Waterhammer in Hydraulics and Wave Surges in Electricity", John Wiley & Sons, Inc., New York, 1961

- Related academic journals:

- Journal of Hydraulic Research,
- Journal of Hydraulic Engineering,
- Journal of Hydraulics