

COURSE OUTLINE

(1) GENERAL

SCHOOL	UNIVERSITY OF THESSALY		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	YΔ0601	SEMESTER	8th
COURSE TITLE	ENVIRONMENTAL FLUID MECHANICS		
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	5
<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		
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> • 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
Specific Knowledge Upon completing the course, the student will possess advanced knowledge regarding: • The application of principles and methods of Environmental Fluid Mechanics • Familiarization with mathematical pollution models
Skills Upon completing the course, the student will acquire advanced problem-solving skills for complex and unpredictable issues, including: • The analysis of environmental flows • The design of environmental protection projects
Competencies Upon completing the course, the student will be able to: • Evaluate and design wastewater disposal projects in marine environments and pollutant dispersion in the atmosphere • Develop and propose optimal or innovative solutions for environmental protection projects

General Competences <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>	
<i>Search for, analysis and synthesis of data and information, with the use of the necessary technology</i> <i>Adapting to new situations</i> <i>Decision-making</i> <i>Working independently</i> <i>Team work</i> <i>Working in an international environment</i> <i>thinking Working in an interdisciplinary environment</i> <i>Production of new research ideas</i>	<i>Project planning and management</i> <i>Respect for difference and multiculturalism</i> <i>Respect for the natural environment</i> <i>Showing social, professional and ethical responsibility and sensitivity to gender issues</i> <i>Criticism and self-criticism</i> <i>Production of free, creative and inductive</i> <i>Others...</i>
• Research, analysis, and synthesis of data and information, utilizing the necessary technologies • Adaptation to new situations • Decision-making • Teamwork • Project planning • Generation of new research ideas • Promotion of free, creative, and inductive thinking • Respect for the natural environment	

(3) SYLLABUS

Week No. – Course contents 1 - Introduction. 2 - Homogeneous fluids. Mixtures. Salinity. Pollutants. 3 - Molecular diffusion. Fick's law. Diffusion equation. 4 - Turbulent diffusion and dispersion. 5 - Taylor's analysis. 6 - Mixing in lakes and reservoirs. 7 - Mixing in rivers. 8 - Discharge dynamics. 9 - Jets and plumes. 10 - Turbulent jets and plumes. 11 - Buoyant jets. 12 - Boundary effects – Buoyancy effects. 13 - Applications. 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	40 hours
	Final examinations	2 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:

- Antonopoulos, "Environmental Hydraulics & Quality of Free Surface Flows", Giahoudis-Giapoulis, 2003.
- Dimitriou , I. D., "Environmental Hydraulics ", Part A and B, Athens, 1994.
- Fischer, H.B., List E.J., Koh, R.C.Y., Imberger J., Brooks, N.H., "Mixing in inland and coastal waters", Academic Press, 1979.
- Gilbert M. Masters, "Introduction to Environmental Engineering and Science", Pearson Higher Education, 1997.

- Related academic journals:

- Physis of Fluids,
- Journal of Fluid Mechanics,
- Environmental Fluid Mechanics,
- Environmental Fluid Dynamics