COURSE OUTLINE

(1) GENERAL

SCHOOL	**UNIVERSITY OF THESSALY**		
ACADEMIC UNIT	DEPARTMENT OF CIVIL ENGINEERING		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	ΓΚ1700	**SEMESTER**	4th
COURSE TITLE	FLUID MECHANICS		

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	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, specialized general knowledge, skills development*	General background
PREREQUISITE COURSES:	Calculus I and II Differential Equations
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (English for Erasmus students)
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uth.gr/course/CIV_U_356/

(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*

Specific Knowledge

After completing the course, the student will have familiarized himself with the basics principles of Fluid Mechanics and the methodology for solving problems related to it balance and the movement (flow) of fluids.

Skills and Competences

Upon completing the course, the student will acquire advanced problem-solving skills, including:

- Calculating hydrostatic pressures and forces on flat and curved submerged surfaces in fluids at equilibrium.
- Determining various flow field parameters for both real and ideal fluids.
- Performing flow calculations based on finite control volumes (integral analysis).
- Analyzing simple laminar flows.
- Gaining an introduction to turbulent flow and boundary layer theory.

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	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive thinking Working in an interdisciplinary environment*
Production of new research ideas	*……*
	Others…
	…….

- Search, analysis and synthesis of data and information, using and necessary technologies
- Adaptation to new situations
- Decision making
- Autonomous work
- Work 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. Properties of Fluids
2 - Hydrostatics I
3 - Hydrostatics II
4 - Streamlines. Pathlines
5 - Advanced Kinematics Concepts
6 - Conservation of Mass. Streamfuction
7 - Conservation of Momentum I
8 - Conservation of Momentum II. Navier Stokes Equation
9 - Conservation of Energy
10 - Integral Analysis of Fluid Motion
11 - Inviscid Flow. Bernoulli Equation
12 - Introduction to Potential Flow Theory
13 - Introduction to Turbulence
14 Introduction to boundary Layer Theory

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY ***Face-to-face, Distance learning, etc.***	Face-to-face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Power-point, notes, tutorials, exercises, and announcements in e-class.

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, interactive teaching, educational visits, project, essay writing, artistic creativity, etc.

Activity	*Semester workload*
Lectures	14*4=56 hours
Study	13*4=52 hours
Project	8 hours
Final examinations	3 hours
Study for exams	16 hours
Educational visit	2 hours (excluded from lectures)

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	**Course total**	**135**
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 for Erasmus students) **Methods of evaluation** 100% final written examinations	

(5) ATTACHED BIBLIOGRAPHY

-Suggested bibliography:

- Gkanoulis I.G., 1982. Introduction to Fluid Mechanics - Εισαγωγή στη Μηχανική των Ρευστών, Thessaloniki (in greek).
- Kostsovinos N.E., 1983. Hydraulics-Υδραυλική, Τόμος πρώτος, Xanthi (in greek).
- Tsaggaris S, 1995. Fluid Mechanics - Μηχανική των ρευστών. Εκδόσεις Συμεών, Αθήνα (in greek).
- Noutsopoulos G. & Christodoulou G., 1996. Fluid Mechanics for Civil Engineers- Μαθήματα Μηχανικής των Ρευστών για Πολιτικούς Μηχανικούς. Α' Έκδοση. NTU of Athens (in greek).
- Papaioannou, A .Th., 1996. Fluid Mechanics - Μηχανική των ρευστών, Τόμοι Ι και ΙΙ. Athens (in greek).
- Demetriou, I. Δ., 1997. Fluid Mechanics - Ρευστομηχανική, Vol. 1 - Εισαγωγή. Athens (in greek).
- Demetriou, I. Δ., 1997. Fluid Mechanics - Ρευστομηχανική, Vol. 2 - Εφαρμογές. Athens (in greek).
- Liakopoulos A., 2011. Fluid Mechanics - Μηχανική Ρευστών, Εκδόσεις Τζιόλα, Thessaloniki (in greek).
- Rouse, H, 1961. Fluid mechanics for hydraulic engineers. Dover.
- Streeter, VL, 1961. Handbook of fluid dynamics. McGraw-Hill.
- Van Dyke, M, 1982. An album of fluid motion. Parabolic Press.
- F. M. White 1986. Fluid Mechanics. McGraw-Hill.
- Fox & McDonald 1998. Introduction to Fluid Mechanics. Wiley.

- Related academic journals:

- Physics of Fluids
- Journal of Fluid Mechanics
- Fluids Review
- Fluids