COURSE OUTLINE

(1) General information

FACULTY/SCHOOL	TECHNOLOGY		
DEPARTMENT	ENVIRONMENTAL SCIENCES		
LEVEL OF STUDY	*Undergraduate*		
COURSE UNIT CODE	NEW **COURSE**	**SEMESTER**	2nd
COURSE TITLE	INTRODUCTORY FLUID MECHANICS		

INDEPENDENT TEACHING ACTIVITIES in case credits are awarded for separate components/parts of the course, e.g. in lectures, laboratory exercises, etc. If credits are awarded for the entire course, give the weekly teaching hours and the total credits	**WEEKLY TEACHNG HOURS**	**CREDITS**
THEORETICAL BACKGROUND	4	4
LABORATORY PRACTICE	-	-
TOTAL	4	4

COURSE TYPE Background knowledge, Scientific expertise, General Knowledge, Skills Development	Background knowledge
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION &EXAMINATION/ASSESSMENT:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

(2) LEARNING OUTCOMES

Learning Outcomes

The course learning outcomes, specific knowledge, skills and competences of an appropriate (certain) level, which students will acquire upon successful completion of the course, are described in detail.
It is necessary to consult:

APPENDIX A

- *Description of the level of learning outcomes for each level of study, in accordance with the European Higher Education Qualifications' Framework.*
- *Descriptive indicators for Levels 6, 7 & 8 of the European Qualifications Framework for Lifelong Learning and*

APPENDIX B

- *Guidelines for writing Learning Outcomes*

The course objective is to expose the students to the basic methodology of solving problems related to fluids in equilibrium or in motion such as:
calculation of hydrostatic forces on plane or curved submerged surfaces in stationary liquids, the calculation of the various parameters in the flow field of real or ideal fluids, control volume analysis of fluid motion, the calculation of laminar viscous flow in simple geometries , as well as an introduction to turbulent flows and boundary-layer theory.
The aim of the course is:
1. Students should be able to understand the basic concepts that are developed in the lesson.
2. Students should be able to apply the knowledge gained in the course in other courses of the next semester, related to Coastal Systems Management, Mathematical Modeling of Environmental Systems, Toxic and Hazardous Waste Management, Modern Hydraulics, Modern Environmental Monitoring Methods studies, etc.).
3. Students should be able to apply the knowledge they will gain in the lesson, to solve environmental problems.

General Competences

Taking into consideration the general competences that students/graduates must acquire (as those are described in the Diploma Supplement and are mentioned below), at which of the following does the course attendance aim?

Search for, analysis and synthesis of data and information by the use of appropriate technologies,	*Project planning and management*
Adapting to new situations	*Respect for diversity and multiculturalism*
Decision-making	*Environmental awareness*
Individual/Independent work	*Social, professional and ethical responsibility and sensitivity to gender issues*
Group/Team work	*Critical thinking*
Working in an international environment	*Development of free, creative and inductive thinking*
Working in an interdisciplinary environment	*……*
Introduction of innovative research	*(Other…….citizenship, spiritual freedom, social awareness, altruism etc.)*
	…….

- *Search for, analysis and synthesis of data and information by the use of appropriate technologies,*
- *Decision-making*
- *Individual/Independent work*
- *Group/Team work*
- *Environmental awareness*
- *Critical thinking*
- *Development of free, creative and inductive thinking*

(3) COURSE CONTENT

1) Introduction. Properties of Fluids
2) Hydrostatics
3) Fluid motion - Bernoulli Equation
4) Advanced Kinematics Concepts of fluid
5) Fluid flow analysis with control volumes
6) Integral Analysis of Fluid Motion
7) Laminar and turbulent flow
8) Introduction to boundary Layer Theory

(4) TEACHING METHODS-ASSESSMENT

<table>
<tr><td>MODES OF DELIVERY
Face-to-face, in-class lecturing, distance teaching and distance learning etc.</td><td>• Lectures
• Semester projects - homework</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGY
Use of ICT in teaching, Laboratory Education, Communication with students</td><td>• Powerpoint presentation.
• e-mail communication.
• e-class theory and exercises</td></tr>
<tr><td>COURSE DESIGN
Description of teaching techniques, practices and methods:
Lectures, seminars, laboratory practice, fieldwork, study and analysis of bibliography, tutorials, Internship, Art Workshop, Interactive teaching, Educational visits, projects, Essay writing, Artistic creativity, etc.

The study hours for each learning activity as well as the hours of self-directed study are given following the principles of the ECTS.</td><td>
<table>
<tr><th>Activity/Method</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Workshop</td><td>13</td></tr>
<tr><td>Laboratory work</td><td>-</td></tr>
<tr><td>Theory study</td><td>38</td></tr>
<tr><td>Weekly individual evaluation reports for laboratory exercises</td><td>10</td></tr>
<tr><td>Course total
(25 hours of workload per credit unit)</td><td>100</td></tr>
</table>
</td></tr>
<tr><td>STUDENT PERFORMANCE EVALUATION/ASSESSMENT METHODS
Detailed description of the evaluation procedures:

Language of evaluation, assessment methods, formative or summative (conclusive), multiple choice tests, short- answer questions, open-ended questions, problem solving, written work, essay/report, oral exam, presentation, laboratory work, other……etc.

Specifically, defined evaluation criteria are stated, as well as if and where they are accessible by the students.</td><td>• Final examinations
• Students should watch at least half seminars
• Work will be given during the semester to be assessed at a rate of 30% on the final grade.

<u>Final Grade</u>
70% in Final Exams + 30% in the semester projects</td></tr>
</table>

(5) SUGGESTED BIBLIOGRAPHY:

-***Suggested bibliography***

-Liakopoulos A., 2019. Fluid mechanic, 2nd edition, Tziolas Publications. Thessaloniki. (in greek)
-Noutsopoulos, G., and Christodoulou, G., 1996. Fluid mechanics for Civil Engineers. NTU Athens. (In Greek)
-Ganoulis, J.G., 1982. Introduction to fluid mechanics. Thessaloniki. (in greek)
- Fox & McDonald 1998. Introduction to Fluid Mechanics. Wiley.
- F. M. White 1986. Fluid Mechanics. McGraw-Hill.
- Demetriou, J.D., 1997. Fluid mechanics, Volume 1 - Introduction. Athens. (in greek)
- Demetriou, J.D., 1997. Fluid mechanics, Volume 2 - Applications. Athens. (in greek)
-Kotsovinos, N.E., 1983. Hydraulics, Volume I. Xanthi. (in greek)
-Papaioannou, A., 1996. Fluid mechanics, Volumes I and II. Athens. (in greek)
-Tsangaris, S., 1995. Mechanics of fluids. Symeon Editions, Athens. (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.

-***Complementary bibliography***

Teacher's notes and the full lecture material, which are available through the asynchronous education platform