COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF PHYSICS		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**404**	**SEMESTER**	**6, 8**
COURSE TITLE	FLUID DYNAMICS		

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	4
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*	Special background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	http://ecourse.uoi.gr/course/view.php?id=1516

(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 course offers an overview of the phenomena of fluid motion and deals with the basic principles and laws of physics underlying these phenomena. Upon completion of the course the students will be able to:

- Describe the phenomena treated by fluid dynamics
- Describe the field description of fluid motion (Eulerian description)
- Compute the Navier-Stokes equations from first principles
- Develop the mathematical description of fluid motion based on the Navier-Stokes equations
- Calculate the fluid flow in the cases of fluid statics, high Reynolds number flows (in the approximation of an irotational fluid) and low Reynolds number flows

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 for, analysis and synthesis of data and information, with the use of the necessary technology. Working independently. Criticism and self-criticism. Production of free, creative and inductive thinking.

(3) SYLLABUS

Basic elements of fluid mechanics. Kinematics of fluids (Lagrangian-Eulerian description). Navier-Stokes equations. Boundary conditions and surface tension. Thermodynamics of fluids. Dimensional analysis – equations for ideal and incompressible fluids. Statics - capilarity. Bernoulli, Kelvin and Bjerknes theorems and applications. Potential flows, complex potential and applications. Viscous flows and flows at low Reynolds number.

(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

Projection of slides and videos with applications during the lectures and use of Moodle on-line learning platform for the dissemination of notes, problem sets as well as contacting the students.

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.

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

Activity	***Semester workload***
Lectures	39
Tutorials	13
Bibliography study	30
Non-guided study	15
Exams	3
Course total	***100***

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,

Problem sets (during the semester) and written exam at the end of the course containing theory and problem solving.

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.*	

(5) ATTACHED BIBLIOGRAPHY

Suggested bibliography :

- Vlachakis N., Fluid dynamics, Tziola Press (2019)
- Papaioannou A., Fluid Mechanics, Symmetria Press (2004)
- Liakopoulos. A., Fluid Mechanics, Tziola Press (2019)
- Elger, Williams, Crowe, Roberson, Fluid Mechanics, Tziola Press (2018)