1.1.1 Computational Methods in Fluid Mechanics

GENERAL

SCHOOL	Engineering
ACADEMIC UNIT	CIVIL ENGINEERING
LEVEL OF STUDIES	Undergraduate
COURSE CODE	YΔP008 **SEMESTER** 7th
COURSE TITLE	Computational Methods in 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, specialised general knowledge, skills development*	Specialization Course
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	

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*
Upon successful completion of this course, students will be able to: recognize and identify the basic principles of numerical methods reported for solving fluid mechanics problems   solve fluid flow equations and systems of equations using computational techniques and synthesize numerical fluid flow analysis models

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...* *.......*

The course contributes to the following skills:
_Search for, analysis and synthesis of data and information, with the use of the necessary technology
_Adapting to new situations
_Decision-making
_Working independently
_Project planning and management
_Criticism
_Production of free, creative and inductive thinking.

SYLLABUS

Computational Fluid Mechanics. Basic considerations, flow equations and function and required numerical algorithm development steps. Fluid flow numerical solving techniques. Types of partial differential equations for flow mechanics and ierative processes for solving.

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*	Powerpoint presentations, e-learning platform for educational material

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	40
	Practice/exercises	12
	Individual study	78
	Course total (26 hours workload per ECTS credit)	**130**

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. Written test with extended answer questions (formative and/or inferential). Theory assessment (100% of the final grade): • A written progress examination (30% of the final grade) including: _Theoretical Extended Response Questions (formative and/or inferential) _Problem-solving exercises. • Written final examination (70% of the final grade) including: _Theoretical extended response questions (formative and/or inferential) _Problem-solving exercises. The present course description with the assessment criteria is accessible to students in the Departmental study guide (Departmental website) and on the course website.

	The outline is communicated orally to students during the first lecture.

ATTACHED BIBLIOGRAPHY

- [In Greek] Σούλης Ιωάννης, ΥΠΟΛΟΓΙΣΤΙΚΗ ΜΗΧΑΝΙΚΗ ΡΕΥΣΤΩΝ, Εκδόσεις ΧΑΡΑΛΑΜΠΟΣ ΝΙΚ. ΑΪΒΑΖΗΣ, 2008, ISBN: 978-960-99293-2-5. Κωδικός Βιβλίου στον Εύδοξο: 1100
- [In Greek] Σούλης Ιωάννης, Υπολογιστικές τεχνικές Υδραυλικής Μηχανικής, Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN: 978-960-603-044-4. Κωδικός Βιβλίου στον Εύδοξο: 320306
- [In Greek] Κουτίτας Χριστόφορος, Υπολογιστική υδραυλική, Εκδόσεις Επίκεντρο, 2005, ISBN: 978-960- 6645-50-1. Κωδικός Βιβλίου στον Εύδοξο: 15198
- [In Greek] Μπεργελές Γ., Υπολογιστική ρευστομηχανική, Εκδόσεις Συμεών, 2012 (5η έκδοση), ISBN: 978-960-9400-37-4. Κωδικός Βιβλίου στον Εύδοξο: 59374709
- [In Greek] Στάμου Αναστάσιος, Εφαρμοσμένη Υδραυλική, Εκδόσεις Παπασωτηρίου, 2016 (3η έκδοση), ISBN: 978-960-491-109-7. Κωδικός Βιβλίου στον Εύδοξο: 59397206