COURSE OUTLINE

1. GENERAL

SCHOOL	NATURAL SCIENCES		
DEPARTMENT	MATHEMATICS		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	MAT_IC468	**SEMESTER OF STUDIES**	8th
COURSE TITLE	NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS		

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*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures and Laboratories	4	6
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*	Elective course
PREREQUISITE COURSES:	Recommended prerequisite knowledge: INTRODUCTION TO NUMERICAL ANALYSIS, INTRODUCTION TO ORDINARY DIFFERENTIAL EQUATIONS
TEACHING AND ASSESSMENT LANGUAGE:	Greek
THE COURSE IS OFFERED TO ERASMUS STUDENTS	No
COURSE WEBPAGE (URL)	

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 student will be able to use numerical methods to approximate solutions of partial differential equations. Upon completing this course the student will further develop the following skills:

- Understanding of the basic numerical methods of partial differential equations.
- Ability to apply a numerical method to solve problems of partial differential equations.
- Ability to distinguish the advantages and disadvantages of various methods in order to choose the most appropriate one for a given problem.
- Ability to implement Matlab/Octave and Python-Sage computing environments for the numerical solution of partial differential equations.

After successfully attending the course, the student will be able to provide approximate solutions of partial differential equations using an appropriate numerical method.

General Abilities

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	*Others…*
Production of new research ideas	

- Search, analyze and synthesize data and information, using the necessary technologies.
- Decision making.
- Autonomous work.
- Working in an interdisciplinary environment.
- Promote free, creative and inductive thinking.

3. COURSE CONTENT

The fundamental numerical techniques for various partial differential equations of hyperbolic, elliptic and parabolic type are studied. These techniques include the following methods: finite differences, finite elements, spectral methods, calculus of variations, optimization, etc.

The numerical implementation of the methods is studied through the computing environments Matlab/Octave and Python-Sage.

4. TEACHING AND LEARNING METHODS - ASSESSMENT

TEACHING METHOD *Face-to-face, Distance learning, etc.*	Face-to-Face Lectures
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES *Use of ICT in teaching, laboratory education, communication with students*	PowerPoint slides. Usage of the computing environments Matlab/Octave and Python-Sage.
TEACHING ORGANIZATION *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 standards του ECTS*	
STUDENT ASSESSEMNT *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*	**Assessment Language:** Greek **Assessment Language for Erasmus students:** English **Assessment methods:** Written final examination which includes theory and problems solving. Minimum passing grade: 5 Maximum passing grade: 10

Activity	***Semester workload***
Lectures	26
Laboratory exercises	26
Solving suggested exercises	30
Personal study by the student	65
Final examination	3
Total number of hours for the Course (25 hours of work-load per ECTS credit)	***150***

5. RECOMMENDED LITERATURE

(in Greek)

- Χατζηπαντελίδης Παναγιώτης και Πλεξουσάκης Μιχαήλ. *Αριθμητική Επίλυση Μερικών Διαφορικών Εξισώσεων*. (e-book). Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Αποθετήριο "Κάλλιπος", 2015.
- Μπαμπατζιμόπουλος Χρήστος. *Εφαρμοσμένη Αριθμητική Επίλυση Μερικών Διαφορικών Εξισώσεων.* (e-book). Σύνδεσμος Ελληνικών Ακαδημαϊκών Βιβλιοθηκών. Αποθετήριο "Κάλλιπος", 2016.