1.1.1 Numerical Analysis

GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	CIVIL ENGINEERING		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	ΓΕΝ008	**SEMESTER**	4th
COURSE TITLE	Numerical Analysis		

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*	Scientific Background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
COURSE WEBSITE (URL)	http://teachers.teicm.gr/vozikis/NumericalAnalysis/index.html

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 completing this course students should be able to recognize the importance of algorithm usage and be able to assess the reliability of their results, understand the utility of numerical methods as fundamental components of design programs and scientific computations, apply numerical methods to compute solutions for large linear systems, find roots of nonlinear equations, calculate areas of complex regions and solve simple differential equations.

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

SYLLABUS

The course deals with basic methods of Numerical Analysis that are analyzed and applied using the Matlab software. Topics covered include solving nonlinear equations and linear/nonlinear systems, interpolation, numerical differentiation, numerical computation of definite integrals, solving differential equations, and solving systems of differential equations. Additionally, the application of these methods to problems in Civil Engineering is studied. In the laboratory part of the course, the methods presented in the theoretical lectures are applied using the Matlab (Octave) software on a computer.

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*	The course is taght in a computer cluster room with Matlab/(Octave clone) and open source GNU
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*	
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.*	Final written examination - open-ended questions (30-40%) - problem - solving questions (70-60%)

Activity	*Semester workload*
Lectures	26
Practice/exercises	13
Practice/exercises	13
Project(s)	16
Individual study	62
Course total (26 hours workload per ECTS credit)	***130***

ATTACHED BIBLIOGRAPHY

- [In Greek]. Παπαϊωάννου Σ., Βοζίκης Χ. 'Εισαγωγή στην Αριθμητική Ανάλυση', Εκδόσεις Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", 2016, ISBN:978-960-603-379-7

-[In Greek]. Σαρρής Ι., Καρακασίδης Θ., Αριθμητικές Μέθοδοι και Εφαρμογές για Μηχανικούς, Εκδόσεις Τζιόλα, 2015, ISBN: 978-969-418-520-7
-[In Greek]. Chapra S., Canale R., Αριθμητικές Μέθοδοι για Μηχανικούς, Εκδόσεις Τζιόλα, 2016, ISBN: 978-960-418-542-9