INSTITUTION	NATIONAL AND KAPODISTRIAN UNIVERSITY OF ATHENS						
SCHOOL	SCHOOL OF SCIENCE						
DEPARTMENT	INFORMATICS AND TELECOMMUNICATIONS						
COURSE LEVEL	UNDERGRADUATE						
COURSE TITLE	**Scientific Computing**						
COURSE CODE	**ΘΠ03**		**Semester**	**6**	**ECTS**	**6**	
TEACHING HOURS per week	**THEORY**	**3**	**SEMINAR.**	1	**LABORATORY**		
COURSE TYPE	Track Compulsory (EYM)						

K	**E1**	**E2**	**E3**	**E4**	**E5**	**E6**
A	B					E

URL	https://eclass.uoa.gr/courses/D34/
EXPECTED PRIOR KNOWLEDGE/ PREREQUISITES AND PREPARATION:	Recommended compulsory K03 Linear Algebra
TEACHING AND EXAMINATIONSLANGUAGE:	GREEK
THE COURSE IS OFFERED TO ERASMUS STUDENTS	NO

COURSE CONTENT

The course covers the design and analysis of numerical algorithms for Matrix computations. Matrix computations consist the core of problems in the Computational Science and Technology. In particular the syllabus of the course is the following

- Error analysis for numerical computations.
- Numerical solution of linear systems. Direct (Gaussian Elimination, Gauss-Jordan, LU Decomposition) and Iterative methods (SOR, SSOR, PSD, Semi-Iterative and Conjugate Gradient).
- Numerical computation of Eigenvalues and Eigenvectors (Jacobi, Givens, LR, QR and Householder)
- Least Squares Problem.
- Numerical solution of Polynomial equations (Bernoulli, Quotient-Difference, Muller, Steffensen, Graffe's and Bairstow) and Non Linear systems of equations (Newton and Newton-SOR).
- Introduction to the numerical solution of Partial Differential equations.

STUDENT LEARNING OBJECTIVES
Teaching-Learning Goals-Expected Learning Outcomes To introduce students to the development and implementation of numerical algorithms for the solution of scientific problems. Upon successful completion of the course the student will be able to: • Develop and implement numerical algorithms for the solution of scientific problems • Evaluate and compare the efficiency of the numerical algorithms • Design and implement scientific software for the simulation of physical phenomena • Implement numerical algorithms in MatLab/C

TEACHING AND LEARNING METHODS – ASSESSMENT	
TEACHING METHOD	In Class (Face to Face)
USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES	Learning process supported by the e-class platform. In particular, slide presentation of course and laboratory lectures, Discussions, Announcements, Task assignments and submissions, Student groups, Laboratory assignments, External Links of electronic books, notes, chapters, lectures, international Laboratories and Job announcements. Email communication Live transmission of lectures Ability to track recorded lectures
TEACHING ORGANIZATION *Describe in detail the way and methods of teaching:* *Enhanced Lectures,* *Online Lectures,* *Seminars,* *Tutorial,* *Laboratory,* *Laboratory Exercise,* *Study & analysis of literature,* *Practice (Positioning),* *Interactive teaching,* *Developing a project,* *Individual / group work* *Telework (reference to tools)etc.* *Details of the student's study hours for each learning activity and hours of non-guided study are shown to ensure that the total workload at the semester corresponds to the ECTS*	The theory and the tutorials are presented by slides. Students are required to submit 4 individual assignments (design, development and evaluation of algorithms implemented in C and or MatLab. The students have the possibility of taking advice through discussions in eclass or during office hours.

Activity	***Student Workload*** *(hours)*
Lectures	39
Tutorial	13
Individual Assignments	50
Independent Study	48
Total Course	***150***

ASSESSMENT OF STUDENTS *Description of the assessment process* *Assessment Methods, Formative or Concluding, Multiple Choice Test, Quick Response Questions, Test Development Questions, Problem Solving, Written Work, Report / Report, Oral Examination, Public Presentation, Laboratory Work, Other / Other* *Fully defined evaluation criteria are mentionedand if and where they are accessible to students.*	The students are required to submit 4 individual assignments and take the final exam. The final exam is a problem solving type and covers the theoretical part of the course while the individual assignments require implementation of algorithms and cover the programming part. Students are eligible to access their written exam paper as well as their assignments and make comments on the evaluation.

Assessment methods	***Number***	***Percentage***
Written examination	1	80%
Individual Assignments	4	20%

LITERATURE AND STUDY MATERIALS / READING LIST

1. Gene H. Golub, Charles F. Van Loan, Theory and Matrix Computations, John Hopkins University Press, 2015 (translated in greek, Publ.).
2. Nikolaos Missirlis, Numerical Analysis : An algorithmic approach, Publication by National and Kapodistrian University of Athens, 2017. https://service.eudoxus.gr/search/#s/%CE%91%CF%81%CE%B9%CE%B8%CE%BC%CE%B7%CF%84%CE%B9%CE%BA%CE%AE%20%CE%91%CE%BD%CE%AC%CE%BB%CF%85%CF%83%CE%B7/0