

COURSE OUTLINE

(1) GENERAL

SCHOOL	ENGINEERING		
ACADEMIC UNIT	Department of Computer Engineering and Informatics		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE		SEMESTER	WINTER
COURSE TITLE	APPLIED MATHEMATICS		
INDEPENDENT TEACHING ACTIVITIES <i>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</i>		WEEKLY TEACHING HOURS	CREDITS
Lectures, Tutorials		3(L), 2(T)	5
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).			
COURSE TYPE <i>general background, special background, specialised general knowledge, skills development</i>	Specialized general knowledge		
PREREQUISITE COURSES:	Recommended prerequisite knowledge: Linear Algebra, Calculus		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek (English if there are Erasmus students)		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)			

(2) LEARNING OUTCOMES

Learning outcomes <i>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.</i> 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 conclusion of the course the students ought to be able to: To know the meaning of the concepts described in the syllabus and be able to use ideas and technics presented, either to solve relevant problems or even describe some typical phenomena from real life with the aid of these concepts.
General Competences <i>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?</i> 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 Working in an interdisciplinary environment Production of new research ideas 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 Others...

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Adapting to new situations
- Decision-making
- Team Work
- Working in an interdisciplinary environment
- Criticism and self-criticism
- Production of free, creative and inductive thinking

(3) SYLLABUS

- Special topics from Linear Algebra such as the pseudoinverse matrix, SVD decomposition, Schur factorization.
- Various applications such as Data compression using SVD, Bezier curves, Computer graphics, Computed tomography, Markov chains, Search engines.
- Existence and uniqueness for initial value problems for a single ordinary differential equation (ODE) or for a system of ODEs.
- Population models.
- RLC circuits,
- Linear systems, generalized eigenvectors, the fundamental matrix solution.
- Linear Dynamical systems, dynamics in two dimensions, stable, unstable and center subspaces.
- Nonlinear Dynamical Systems, linearization around an equilibrium, linearization around a periodic orbit, Chaos.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY <i>Face-to-face, Distance learning, etc.</i>	Face-to-face and distance learning. Tutorials and laboratory sessions with exemplary solutions of exercises.	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY <i>Use of ICT in teaching, laboratory education, communication with students</i>	ICT methods are used in both teaching and communication with the students. Lecture slides and supplementary material are uploaded in the course's web site.	
TEACHING METHODS <i>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.</i> <i>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</i>	Activity	Semester workload
	Lectures	3*13=39
	Tutorials (exercises)	2*13=26
	Study and solving exercises	5*13=65
	Preparation for and final examination	10
	Course total (25-30 hours per ECTS unit)	140

STUDENT PERFORMANCE EVALUATION <i>Description of the evaluation procedure</i> <i>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</i> <i>Specifically-defined evaluation criteria are given, and if and where they are accessible to students.</i>	The language of evaluation is Greek (English in the case of attendance by foreign students). Method of evaluation: The final grade is based either 100% on performance on the final written Examination, or on a final exam on part of the material taught plus a midterm test. The exact method of evaluation is shown from the beginning of the semester in the eclass page of the course. Grading scale 0-10. • Passing grade greater than or equal to 5
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(5) ATTACHED BIBLIOGRAPHY

<i>- Suggested bibliography:</i> <i>(in greek)</i> • Slides and notes are uploaded to eclass. • H. Anton, C. Rorres, Εισαγωγή στη Γραμμική Άλγεβρα και Εφαρμογές, Gutenberg, 2021. • I. Sokolnikoff, R. Redheffer, Μαθηματικά για φυσικούς και μηχανικούς, Πανεπιστημιακές Εκδόσεις ΕΜΠ, 2001. • Ι. Μυριτζής, Δυναμικά Συστήματα, Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", Κωδικός Βιβλίου στον Εύδοξο: 320314 • Γ. Βουγιατζής, Ε. Μελετίδου, Εισαγωγή στα μη γραμμικά Δυναμικά Συστήματα, Ελληνικά Ακαδημαϊκά Ηλεκτρονικά Συγγράμματα και Βοηθήματα - Αποθετήριο "Κάλλιπος", Κωδικός Βιβλίου στον Εύδοξο: 320107 <i>(In English)</i> • J. Rebaza, A First Course in Applied Mathematics, J. Wiley, Hoboken, N. J., 2012. • H. Anton, C. Rorres, Elementary Linear Algebra Applications version, 11th edition, Wiley 2014. • I. S. Sokolnikoff, R. M. Redheffer, Mathematics of Physics and modern Engineering, 2nd edition, McGraw-Hill, New York, 1966.
