SPECIAL TOPICS IN LINEAR ALGEBRA

1. GENERAL

SCHOOL	SCHOOL OF ENGINEERING		
DEPARTMENT	CIVIL ENGENEERING		
LEVEL OF STUDIES	POST-GRADUATE, LEVEL 7		
COURSE CODE		**SEMESTER**	2nd SEMESTER
COURSE TITLE	SPECIAL TOPICS IN LINEAR ALGEBRA		

TEACHING ACTIVITIES *If the ECTS Credits are distributed in distinct parts of the course e.g. lectures, labs etc. If the ECTS Credits are awarded to the whole course, then please indicate the teaching hours per week and the corresponding ECTS Credits.*	**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
	3	7,5
Please, add lines if necessary. Teaching methods and organization of the course are described in section 4.		

COURSE TYPE *Background, General Knowledge, Scientific Area, Skill Development*	Scientific Area
PREREQUISITES:	None
TEACHING & EXAMINATION LANGUAGE:	Greek
COURSE OFFERED TO ERASMUS STUDENTS:	No
COURSE URL:	https://eclass.duth.gr/courses/TMB292/

2. LEARNING OUTCOMES

Learning Outcomes

Please describe the learning outcomes of the course: Knowledge, skills and abilities acquired after the successful completion of the course.

After the successful completion of this course, the post-graduate students will be able:

- To apply methods like “separation of variables”
- To solve partial differential equations
- To solve boundary-initial value problems
- To study the asymptotic behavior of the solutions of difference equations
- To study the boundedness, convergence and the stability of difference equations

General Skills

Name the desirable general skills upon successful completion of the module

Search, analysis and synthesis of data and information, Project design and management

ICT Use *Adaptation to new situations* *Decision making* *Autonomous work* *Teamwork* *Working in an international environment* *Working in an interdisciplinary environment* *Production of new research ideas*	*Equity and Inclusion* *Respect for the natural environment* *Sustainability* *Demonstration of social, professional and moral responsibility and sensitivity to gender issues* *Critical thinking* *Promoting free, creative and inductive reasoning*

- Search, analysis and synthesis of data and information, ICT Use.
- Adaptation to new situations.
- Decision making.
- Autonomous work.

3. COURSE CONTENT

Linear spaces. Inner products. Inner product spaces. Orthogonal projection. Gram-Smidt orthonormalization. Linear operators. Adjoint operators. Operators in inner product spaces. Orthonormal operators. Isomorphisms. Normal operators. Tranformation of symmetric matrices to diagonal form. Basic theorems and applications. N-th root of a matrix. Diagonalization of matrices with multiplicity *k*. Computation of the power of a matrix. Application of the theory of 2X2 matices to the stability of difference equations and to the linearization of difference equations. Jordan canonical form.

4. LEARNING & TEACHING METHODS - EVALUATION

TEACHING METHOD *Face to face, Distance learning, etc.*	Live distance learning
USE OF INFORMATION & COMMUNICATIONS TECHNOLOGY (ICT) *Use of ICT in Teaching, in Laboratory Education, in Communication with students*	Use of ICT in teaching and in communication with the students
TEACHING ORGANIZATION *The ways and methods of teaching are described in detail.* *Lectures, Seminars, Laboratory Exercise, Field Exercise, Bibliographic research & analysis, Tutoring, Internship (Placement), Clinical Exercise, Art Workshop, Interactive learning, Study visits, Study / creation, project, creation, project. Etc.* *The supervised and unsupervised workload per activity is indicated here, so that total workload per semester complies to ECTS standards.*	

Activity	*Workload/semester*
Lectures	39
Bibliographical research and study	78
Assignments during the course	30
Final written exam	3
Total	**150**

STUDENT EVALUATION *Description of the evaluation process* *Assessment Language, Assessment Methods, Formative or Concluding, Multiple Choice Test, Short Answer Questions, Essay Development*	Assignments during the course. Final written exam.

Questions, Problem Solving, Written Assignment, Essay / Report, Oral Exam, Presentation in audience, Laboratory Report, Clinical examination of a patient, Artistic interpretation, Other/Others *Please indicate all relevant information about the course assessment and how students are informed*	

5. SUGGESTED BIBLIOGRAPHY

1. K. Hoffman, R. Kunze, Linear Algebra, Prentice-Hall Inc., New Jersey 1971.
2. R. Bellman, Introduction to Matrix Analysis, McGraw-Hill Book Company, New York 1970.
3. B. Noble, J. W. Daniel, Applied Linear Algebra, Prentice-Hall Inc, New Jersey 1977.
4. R. A. Horn, C. R. Johnson, Matrix Analysis, Cambridge University Press, New York 1991.

ANNEX OF THE COURSE OUTLINE

Alternative ways of examining a course in emergency situations

Teacher (full name):	Prof. Christos Schinas Prof. Garyfalos Papaschinopoulos
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Supervisors: (1)	No
Evaluation methods: (2)	Students are evaluated via written assignments during the course and a written final assignment.
Implementation Instructions: (3)	The course is given via live distance learning and emergency situations will not affect lectures and student evaluation.

(22) Please write YES or NO

(23) Note down the evaluation methods used by the teacher, e.g.

6. *written assignment* or/and exercises
7. written or oral examination with distance learning methods, provided that the integrity and reliability of the examination are ensured.

(24) In the **Implementation Instructions** section, the teacher notes down clear instructions to the students:

a) in case of **written assignment and / or exercises:** the deadline (e.g. the last week of the semester), the means of submission, the grading system, the grade percentage of the assignment in the final grade and any other necessary information.

b) in case of **oral examination with distance learning methods:** the instructions for conducting the examination (e.g. in groups of X people), the way of administration of the questions to be answered, the distance learning platforms to be used, the technical means for the implementation of the examination (microphone, camera, word processor, internet connection, communication platform), the hyperlinks for the examination, the duration of the exam, the grading system, the percentage of the oral exam in the final grade, the ways in which the inviolability and reliability of the exam are ensured and any other necessary information.

c) in case of **written examination with distance learning methods**: the way of administration of the questions to be answered, the way of submitting the answers, the duration of the exam, the grading system, the percentage of the written exam of the exam in the final grade, the ways in which the integrity and reliability of the exam are ensured and any other necessary information.

There should be an attached list with the Student Registration Numbers only of students eligible to participate in the examination.