COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY		
ACADEMIC UNIT	DEPARTMENT OF STATISTICS		
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)		
COURSE CODE	**6082**	**SEMESTER**	**2nd**
COURSE TITLE	Linear Algebra II		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	4	7,5
Workshops		
Labs	2	

COURSE TYPE	Compulsory-General Background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat/content/linear-algebra-ii-75-ects

(2) LEARNING OUTCOMES

Learning outcomes
In-depth understanding of the concepts of the course so that students can answer questions related to the course's learning outcomes. They will gain a geometric overview of concepts such as projection, determinants, eigenvalues and eigenvectors. Additionally, students will be able to reply this knowledge to solve practical exercises, including calculating a projection matrix, solving interpolation problems with least squares, matrix diagonalization, and calculating contour lines of a quadratic form.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Adaptation to new situations • Autonomous work • Promotion of free, creative and inductive thinking

(3) SYLLABUS

Least Squares approach, Rectangular matrices, the Gramm-Schmidt rectangularization and A=QR factorization. Determinants. Eigenvalues and characteristic polynomial, eigenvectors and eigenspaces. Matrix diagonization. Matrix powers and spectral theorem for symmetric matrices. Basis coordinates and similar matrices. Quadratic forms in symmetrical matrices: positive, Rayleigh quotient, ellipsoids in n-dimensions. Examples from the multivariate normal distribution. Singular values decomposition. Complex matrices, Hermitian matrices, and unitary matrices.

(4) TEACHING and LEARNING METHODS - EVALUATION

<table>
<tr><td>DELIVERY
Face-to-face, Distance learning, etc.</td><td>Face-to-face</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY</td><td>YES, use in teaching, eclass</td></tr>
<tr><td>TEACHING METHODS</td><td>
<table>
<tr><th>Activity</th><th>Semester workload</th></tr>
<tr><td>Lectures</td><td>120</td></tr>
<tr><td>Tutorial</td><td>67.5</td></tr>
<tr><td>Course total</td><td>187.5</td></tr>
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<tr><td>STUDENT PERFORMANCE EVALUATION
.</td><td>Written examination at the end of the semester

Information is available on eclass</td></tr>
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(5) ATTACHED BIBLIOGRAPHY

- Gilbert Strang (1999). Γραμμική Άλγεβρα και Εφαρμογές, Πανεπιστημιακές Εκδόσεις Κρήτης.
- Ε. Ξεκαλάκη & Ι. Πανάρετος (1993). Γραμμική Άλγεβρα για Στατιστικές Εφαρμογές, Αθήνα.
- Η. Φλυτζάνης (1999). Γραμμική Άλγεβρα & Εφαρμογές, Τεύχος Α: Γραμμική Άλγεβρα, Το Οικονομικό.
- Γ. Δονάτος-Μ. Αδάμ (2008). Γραμμική Άλγεβρα, Θεωρία και Εφαρμογές, Gutenberg.
- Graybill F.A. (1969). Introduction to Matrices with Applications in Statistics, Wadsworth, Belmont, CA.
- Harville D.A. (1997). Matrix Algebra from a Statistician's perspective, Springer.
- Healy M.J.R. (1995). Matrices for Statistics, Oxford University Press.
- Searle S.R. (1982). Matrix Algebra Useful for Statistics, Wiley.