COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering		
ACADEMIC UNIT	Department of Naval Architecture		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	NAOME1106	**SEMESTER**	1st
COURSE TITLE	**LINEAR ALGEBRA**		
INDEPENDENT TEACHING ACTIVITIES		**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures		4	4
COURSE TYPE *general background, specialbackground, specialised general knowledge, skills development*	General background		
PREREQUISITE COURSES:			
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA232/		

(2) COURSE GOALS / LEARNING OUTCOMES

This course aims to provide students with mathematical knowledge and skills needed to support their concurrent and subsequent engineering studies. Specifically, it is designed to introduce students to the theory of systems of linear equations and to mathematical proof. Topics include solving systems of linear equations, linear independence, linear transformations, matrix operations, determinants, vector spaces, eigenvalues and eigenvectors, and applications.

Learning Outcomes:

On completion of this course the student should be able to:

- Understand the basic concepts of analytic geometry in two and three dimensions.
- Solve systems of linear equations, including Gaussian elimination and matrix inversion, and interpret their results.
- Carry out matrix operations, including inverses and determinants.
- Understand the basic concepts of vector space and subspace.
- Demonstrate understanding of linear independence, span, and basis.
- Determine eigenvalues and eigenvectors and solve eigenvalue problems.

(3) COURSE CONTENT / SYLLABUS

- **Elements of Analytic Geometry**
  Vectors and geometry in two and three space dimensions, scalar and vector products, linear combinations, projection. Straight lines and planes in three dimensions and the relationships between them.
- **Linear Algebra**
  Systems of linear equations, row reduction and Echelon forms
  Matrix algebra: matrix operations, inverse of a matrix, invertible matrices
  Determinants
  Vector spaces and subspaces: span, linear independence, bases and dimension.
  Inner product spaces: Scalar or inner products, Cauchy-Schwartz inequality, orthogonality, orthogonal projection, orthonormal bases, Gram-Schmidt process.
  Linear transformations: Row and Column rank of a matrix, applications to systems of equations, range, kernel, rank and nullity, invertibility of linear transformations, linear transformations and 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
Use of ICT in teaching, laboratory education, communication with students</td><td>• Use of ICT in teaching.
• Use of mathematical software.
• Support learning through the electronic e-class platform.</td></tr>
<tr><td>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</td><td>
<table>
<tr><th>Activity</th><th>Workload (hours)</th></tr>
<tr><td>Lectures</td><td>39</td></tr>
<tr><td>Practice exercises (tutorials)</td><td>13</td></tr>
<tr><td>Study of Lectures</td><td>65</td></tr>
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<tr><td></td><td></td></tr>
<tr><td>Course total</td><td>117</td></tr>
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<tr><td>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</td><td>Final written examination: 100%</td></tr>
</table>

(5) ATTACHED BIBLIOGRAPHY

1. G. Strang, Introduction to Linear Algebra, 5th edition, Wellesley-Cambridge Press, 2016.
2. G. Strang, Linear Algebra and its Applications, 4th edition, Cengage Learning, 2006.
3. D.C. Lay, S.R. Lay, J.J. McDonald, Linear Algebra and its Applications, 4th edition, Pearson, 2014.
4. S. Axler, Linear Algebra Done Right, 3rd edition, Springer, 2015.