COURSE OUTLINE

1. GENERAL

SCHOOL	Engineering
ACADEMIC UNIT	Mechanical Engineering
LEVEL OF STUDIES	Undergraduate
COURSE CODE	ΓΕ0102 **SEMESTER** 2nd
COURSE TITLE	Applied Mathematics II

INDEPENDENT TEACHING ACTIVITIES *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*	WEEKLY TEACHING HOURS	CREDITS
Lectures, Practical Exercises	5	6
Add rows if necessary. The organization of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialized general knowledge, skills development*	Core, General Knowledge
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No
ΗΛΕΚΤΡΟΝΙΚΗ ΣΕΛΙΔΑ ΜΑΘΗΜΑΤΟΣ (URL)	https://www.mie.uth.gr/?page_id=10180

2. LEARNING OUTCOMES

Learning outcomes
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.
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 successful completion of the course, students will be able to:
- Be able to use and apply definitions and concepts from Calculus and Linear Algebra in purely mathematical as well as applied contexts.
- Be able to use and apply mathematical knowledge and methods to solve fundamental mathematical problems in the technological sciences, following a systematic approach.
- Develop critical thinking skills through the verification of results.
- Be able to interpret the results in relation to the problem modeled mathematically.

General Competences

Taking into consideration the general competences that the degree-holder must acquire (as these appear in the Diploma Supplementand appear below), at which of the following does the course aim?

Search for, analysis and synthesis of data and information, with the use of the necessary technology	*Project planning and management*
Adapting to new situations	*Respect for difference and multiculturalism*
Decision-making	*Respect for the natural environment*
Working independently	*Showing social, professional and ethical responsibility and sensitivity to gender issues*
Team work	*Criticism and self-criticism*
Working in an international environment	*Production of free, creative and inductive*
thinkingWorking in an interdisciplinary environment	*......*
Production of new research ideas	*Others…*

- Retrieve, analyze and synthesize data and information
- Working independently
- Decision making
- Development of innovative and inductive thinking
- Critical thinking

3. SYLLABUS

Functions of Several Variables – Limits – Differentiation – Local Extrema – Hessian

Multiple Integrals – Transformations – Jacobian

Vector Fields – Differentiation – Line Integrals – Potential Functions – Green's Theorem

Matrices – Operations – Inverse Matrix

Linear Systems – Gaussian Elimination – LU and LDU Factorization

Determinants – Sarrus' Rule – Laplace Expansion – Cramer's Rule

Vector Spaces – Linear Independence – Basis – Dimension – Rank of a Matrix – Wronskian

Linear Transformations – Kernel – Endomorphisms – Monomorphisms – Epimorphisms – Isomorphisms – Automorphisms – Rank – Matrix of a Linear Mapping – Change of Basis Matrix – Similar Matrices

Eigenvalues – Eigenvectors – Spectrum – Eigenspace – Geometric/Algebraic Multiplicity – Characteristic Polynomial – Cayley-Hamilton Theorem – Matrix Diagonalization

4. TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face to face, Distance learning, etc.*	Face to face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Use of ICT
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*	<table><tr><td>*Activity*</td><td>*Semester workload*</td></tr><tr><td>Lectures</td><td>70 hours</td></tr><tr><td>Self-evaluating exercises</td><td>35 hours</td></tr><tr><td>Autonomous work</td><td>45 hours</td></tr><tr><td>*Total*</td><td>*150* hours</td></tr></table>
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 Specifically-defined evaluation criteria are given, and if and where they are accessible to students.*	I. Midterm exam (50%) II. Final exam (50%)

5. ATTACHED BIBLIOGRAPHY

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- Βλάχος Λ., Διαφορικός λογισμός συναρτήσεων πολλών μεταβλητών, 2001, Εκδ. Τζιόλα
- Γεωργανόπουλος Γ., Ξενικάκης Π., Διαφορικός λογισμός πολλών μεταβλητών, 2000, Εκδ. Κυριακίδη
- Παπασχοινόπουλος Γ., Σχοινάς Χ. Μυλωνάς Ν., Λογισμός συναρτήσεων πολλών μεταβλητών και εισαγωγή στις διαφορικές εξισώσεις, 2021, Εκδ. Τζιόλα
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- Ρασσιάς Θ., Μαθηματικά II, 2017, Εκδ. Τσότρας
- Τσίτσας Λ., Εφαρμοσμένος απειροστικός λογισμός II, Εκδ. Συμμετρία, Αθήνα
- Χαζάρας Ι., Γραμμένος Θ., Εισαγωγή στη Γραμμική Άλγεβρα, 2011, Εκδ. Τζιόλα
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- Holt J., Γραμμική Άλγεβρα με εφαρμογές, 2023, Εκδ. Gutenberg