COURSE OUTLINE

CE0110 – Mathematical Analysis & Linear Algebra

(1) GENERAL

SCHOOL	ENGINEERING SCHOOL		
ACADEMIC UNIT	CIVIL ENGINEERING DEPARTMENT		
LEVEL OF STUDIES	UNDERGRADUATE		
COURSE CODE	**CE0110**	**ΕΞΑΜΗΝΟ ΣΠΟΥΔΩΝ**	**1^0**
COURSE TITLE	**Mathematical Analysis & Linear Algebra**		

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**
	5	6
Add rows if necessary. The organisation of teaching and the teaching methods used are described in detail at (d).		

COURSE TYPE *general background, special background, specialised general knowledge, skills development*	General Background Course
PREREQUISITE COURSES:	-
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	-
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/CIV197/

(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*

By the successful completion of the course the student will be able to:

1. Describe the basic natural notions using Mathematics.
2. Recognize and distinguish various methods for solving problems via Mathematics.
3. Find solutions in Mathematical problems, explain and apply these solutions from the Mathematical models he /she uses in each area of his/her study.
4. The course's goal is to make students able to develop critical thought, free their imagination and their creativity. At the same time helps students to acquire basic notions of elementary

Mathematics so they will be able to understand higher Mathematics which are necessary for the completion of their curriculum.

General Competences

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?;.

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 thinking*
Working in an interdisciplinary environment	*……*
Production of new research ideas	*Others…*

Specifically, students will be able to perform:

- Search, analysis and synthesis of data and information, using the necessary technologies.
- Decision Making.
- Autonomous work.

(3) SYLLABUS

MATHEMATICAL ANALYSIS

Functions of real numbers, trigonometrical and hyperbolic functions. The concepts of the limit and continuity of a real function, fundamental results. Derivatives of real functions, fundamental theorems, Taylor's formula. Power series. Taylor and Maclaurin series. The Riemann integral of a real-valued function, tests of integrability, properties of the Riemann integral, fundamental results. Basic integration techniques. Applications. Generalized integrals, convergence tests. Applications. Sequences of real numbers, the concept of the limit of a sequence, convergence tests. Series of real numbers, convergence tests.

LINEAR ALGEBRA

Vector calculus, lines and planes in 3-space. The basic surfaces. Matrices, determinants and linear systems. Linear spaces. Linear mappings (basic definitions, the matrix of a linear mapping, the basic geometric transformations, change of basic). Eigenvalues and eigenvectors of linear transformations and matrices (characteristic polynomial, Cayley-Hamilton theorem, matrix diagonalization). Orthogonal and symmetric matrices.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY *Face-to-face, Distance learning, etc.*	Lectures, Blackboard presentation. Exercises, tests and homework.
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY *Use of ICT in teaching, laboratory education, communication with students*	Communication and Electronic Submission.
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*	
STUDENT PERFORMANCE EVALUATION	

Activity	*Semester workload*
Lectures	65
Classwork	26
Preparation for Project	26
Personal Study	33
Course total	**150**

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.*	Language of evaluation: Greek • Final written exam: 100% or • Mid-term exam: 20% • Final written exam: 80% The evaluation criteria are presented to the students prior to the exam, the grading system assigned to the examination is clearly determined and the final grade received by the students is accessible via the online platform of the Institution. In addition, the students can see their writings, their overall and individual scores for each examination question and they can be given clarifications. Finally, any mistakes are also reported and pointed out.

(5) **ATTACHED BIBLIOGRAPHY**

Greek Bibliography:

1. Vryzidis L., Makrigiannis A., Sassalos S., (2016), "General Mathematics/Algebra – Analytic Geometry – Differential Calculus – Integral Calculus", Modern Publishibg L.T.D.
2. Rassias T., (2016), "Mathematical Analysis", Tsotras Publishing.
3. Finney R.L., Weir M.D., Giordano F.G., (2015), "Infinite Calculus", Crete University Press.

Foreign Bibliography:

1. Courant R., John F., (1999), Introduction to Calculus and Analysis I, Springer.