COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Engineering
ACADEMIC UNIT	Department of Naval Architecture
LEVEL OF STUDIES	Undergraduate
COURSE CODE	NAOME1108
COURSE TITLE	MATHEMATICAL ANALYSIS II

COURSE CODE	NAOME1108		**SEMESTER**	2nd

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS (ECTS)**
Lectures	5	6

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	No
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/NA216/

(2) COURSE GOALS / LEARNING OUTCOMES

The purpose of this course is to provide students with the core mathematical skills and knowledge, particularly the use of multivariable and vector calculus, needed to perform fundamental mathematical procedures for solving engineering problems. It also aims to indicate the relevance of mathematics to engineering and applied science.

Learning Outcomes:

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

- solve first and second order ordinary differential equations
- manipulate partial derivatives, manipulate vectors
- apply the principles of double, line, and surface integrals
- formulate and solve problems using techniques of differential and integral calculus of several variables.

(3) COURSE CONTENT / SYLLABUS

1. Introduction to Ordinary Differential Equations

Definition, First order linear Ordinary Differential Equations (O.D.E.'s), Second order linear O.D.E.'s with constant coefficients. Laplace transform and its application for solving O.D.E.'s.

2. Functions of several variables

- Definition, graphs, Limits and Continuity in Higher Dimensions.
- Partial derivatives, Chain rule, Directional derivatives and gradient vectors, Tangent Planes and Differentials.
- Extreme Values and Saddle Points, Lagrange Multipliers.
- Taylor's formula for two variables

3. Vector-valued functions

- Definition, limits and continuity.
- Differentiation and integration.
- Parametric equations of curves.

4. Vector Calculus

- Scalar and vector fields.
- Differential operators (div, grad, curl).
- Conservative vector fields.

5. Line and surface integrals

- Line integrals: definition for a scalar field, derivation, applications. Definition for a vector field, derivation, applications. Path independence.
- Surface integrals: parametric representation of a surface, the fundamental vector product, surface element, definition and evaluation of surface integral.

6. Multiple integrals

Double and triple integrals, properties, techniques of integrations, Substitutions in multiple integrals, Green's theorem, Stokes' theorem.

(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. • Use of mathematical software. • Support learning through the electronic

Use of ICT in teaching, laboratory education, communication with students	e-class platform.	

	Activity	Workload (hours)
TEACHING METHODS	Lectures	52
The manner and methods of teaching are described in detail.	Practice exercises (tutorials)	13
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.	Study of Lectures	91
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		
	Course total	**156**

STUDENT PERFORMANCE EVALUATION	Final written examination: 100%
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	

(5) ATTACHED BIBLIOGRAPHY

1. R.L. Finney, M.D. Weir, F.R. Giordano, Thomas' Calculus, 12th edition, Addison-Wesley, 2010.
2. J.E. Marsden, A. Tromba, Vector Calculus, 5th edition, W. H. Freeman, 2003.
3. J.D. Logan, A First Course in Differential Equations, 3rd Edition, Springer, 2015.
4. H.M. Schey, *Div*, *Grad*, *Curl, and All That*: An Informal Text on Vector Calculus (Fourth Edition), W.W. Norton & Co. Inc.