



COURSE OUTLINE

(1) GENERAL

SCHOOL	School of Technology		
ACADEMIC UNIT	Department of Environmental Sciences		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	AY204	SEMESTER	2nd
COURSE TITLE	MATHEMATICS II		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Teaching Hours		6	5
COURSE TYPE	General background		
PREREQUISITE COURSES	None		
LANGUAGE OF INSTRUCTION and EXAMINATIONS	Greek		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	No		
COURSE WEBSITE (URL)	https://eclass.uth.gr/courses/ENV_U_110/		

(2) LEARNING OUTCOMES

Learning outcomes
Upon successful completion of the course, students will have acquired the first basic knowledge of mathematics required to attend a Level 6 study programme in general, and more specifically to attend a series of other courses in the Environmental Sciences study programme. Specifically, they will have gained knowledge on: • Vector-valued Functions, to describe and understand curves in space and other sizes. • Multi-Variable Function Analysis that will allow them to work with derivatives, double, triple, line and surface integrals and their applications in geometry, physics and engineering. • Ordinary Differential Equations, for understanding mathematical modeling of natural phenomena and processes and solving them with analytical and numerical methods.
General Competences
• Search for, analysis and synthesis of data and information, with the use of the necessary technology • Decision-making • Working independently • Team work • Criticism and self-criticism • Production of free, creative and inductive thinking

(3) SYLLABUS

<u>Vector-valued functions:</u> • Limits, continuity, derivatives και integration. Curves in space, tangent and vertical vector in curve, curvature and torsion, Frenet frame.
<u>Multiple Variable Function Analysis:</u> • Graphs, Stationary curves and surfaces. Limits, continuity and R^n derivation. • Partial derivative. Directional derivative. • Extreme values, constrained extrema and Lagrange multipliers. • Double integrals over rectangles and polar coordinates, calculation of areas and centers of mass. • Triple integrals over rectangles and polar coordinates, calculation of areas and centers of mass. • Line integrals of the first and second kind. Vector fields. • Potential functions, conservative fields. Green's theorem in the plane. • Surface integrals of the first and second kind, Gauss theorem, Green's theorem in the plane.
<u>Differential Equations:</u> • Equations of 1st order.

- Equations of 2nd order.
- Solution of linear differential equations and initial value problems.
- Solution of linear differential equations and border value problems.

(4) TEACHING and LEARNING METHODS – EVALUATION

DELIVERY	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	• Use of PowerPoint slides • View material in video • Communication with students via e-mail • Use of asynchronous distance learning (e-class)	
TEACHING METHODS	Activity	Semester workload
	Lectures	52
	Laboratory practice	26
	Study and analysis of bibliography	35
	Essay writing	12
	Course total (25 hours workload per credit)	125
STUDENT PERFORMANCE EVALUATION	Students' performance is evaluated in the Greek language. The final grade is determined by: • A written exam (at the end of the semester) that contributes 90% to the final grade, applying one or more of the following evaluation methods: Multiple choice questions, short-answer questions, problem solving. • Students' participation in laboratory practice activities and the preparation and delivery of related written assignments (during the semester) that contribute 10% to the final grade. Final Grade =90% Exam Grade + 10% Assignments Grade	

(5) ATTACHED BIBLIOGRAPHY

- Hatzikonstantinou P. (2017) *Mathematical Methods for Engineers and Scientists*, (1st ed). Patra: GOTSIS Publications (in Greek)
- Papaschoinopoulos, G., Schoinas, C., & Mylonas, N. (2016) *Calculation of Functions of Many Variables and Introduction to Differential Equations* (1st ed). Thessaloniki: TZIOLA Publications (in Greek)
- Rassias, Th. (2017) *Mathematics II*, (2nd ed). Athens: TSOTRAS Publications (in Greek)