COURSE OUTLINE

(1) GENERAL

SCHOOL	Engineering		
ACADEMIC UNIT	Industrial Design and Production Engineering		
LEVEL OF STUDIES	Undergraduate		
COURSE CODE	**3001**	**SEMESTER**	**3**
COURSE TITLE	Differential and Integral Calculus II		

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
Lectures	3	3
Laboratory	1	2
	4	**5**

COURSE TYPE	General background
PREREQUISITE COURSES:	No
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	Greek
IS THE COURSE OFFERED TO ERASMUS STUDENTS	Yes
COURSE WEBSITE (URL)	https://eclass.uniwa.gr/courses/IDPE237/

(2) LEARNING OUTCOMES

Learning outcomes

Upon successful completion of this course, the students will be able to acquire:

- the ability to deal with problems involving real number series, power series, indefinite integrals, definite integrals and their applications, in generalized integrals
- the required theoretical background and the ability to use the differential calculus of functions of two independent variables, which refer to problems of three-dimensional space
- the ability to deal with problems involving real number series, power series, and generalized integrals
- the ability to apply optimization techniques to modeling problems of the engineering specialty involving functions of many independent variables
- the ability to use the Matlab software environment for the implementation of the methods and algorithms of the course.

General Competences

- Search for, analysis and synthesis of data and information, with the use of the necessary technology
- Decision-making
- Working independently

(3) SYLLABUS

Generalized integrals. Generalized integrals of the 1st order. Geometric interpretation. Convergence of generalized integral. Convergence criteria (Cauchy criterion, comparison criterion and marginal comparison). Generalized integrals of the 2nd order. Beta Function. Gamma function.

Series of real numbers. Convergence of series. Series of non-negative terms. Convergence criteria (geometric series, integral criterion, root-ratio criteria, comparison and marginal comparison criteria, Leibniz criterion, absolute convergence).

Function sequences. Function sequences convergence. Uniform convergence criteria (Cauchy criterion, Dini criterion, Weierstrass theorem, Newton-Gregory formula).

Series of functions. Convergence criteria. Continuity, integration and series derivation theorems.

Power series. Power series radius and convergence space. Cauchy-Hadamard Theorem. Theorems of continuity, integration and derivation. Taylor Series. Taylor formula. Binomial series.

Functions of many variables. Limit. Continuity. Partial continuity.

Differential calculus of functions of many variables. Partial derivative. Derivative by direction. Total derivative. Chain rule. Scalar field slope. Upper class differential. Deviation. Swirl. Material derivative. Jacobi Determinant. Taylor theorem for functions of two variables. Complex functions.

Optimization. Extremes of a function of many variables. Conditional extremes and Lagrange multipliers. Applications in the minimal squares' method.

Applications using Matlab software. Optimization of functions of many variables in Matlab. Numerical derivation and integration of functions of many variables.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face	
USE OF INFORMATION ANDCOMMUNICATIONS TECHNOLOGY	Communication with students through the platform with emails & announcements on the course's website (e-class). Powerpoint display with projector and laptop. Demonstration of modern mathematical software (Matlab, Mathematica, Wolfram Alpha) on the taught subjects. Announcement of course notes in electronic form on the course's website (e-class). Referral to websites with related applications (Desmos, Maxima, Geogebra). Utilization of the computer laboratory of the Department. Possibility of examinations through the tool of Exercises in e-class.	
TEACHING METHODS	***Activity***	***Semester workload***
	Lectures	39
	Tutorials	26
	Computing exercises	30
	Individual study	55
	Course Total (30h/ECTS)	**150**

STUDENT PERFORMANCE EVALUATION	**Language of assessment:** Greek (English for ERASMUS students upon request). Students are assessed through a written examination, which includes short-answer questions and problem solving. There is a possibility for an intermediate examination in the middle of the semester. Delivery of assignments and written/oral examination in the Tutorials (20%). Students with learning difficulties are examined in accordance with article 37 of the Internal Regulations of the UNIWA. The evaluation criteria have been presented to the students before the final examination and the individual grade of the subjects is written in them. Students can see their writing and their individual grades in the topics, as well as receive clarifications about them after pointing out any mistakes.

(5) **ATTACHED BIBLIOGRAPHY**

***- Suggested bibliography**:*

1. Goldstein Larry J., Lay David C., Schneider David I., Asmar Nakhle H. (2020). Διαφορικός και Ολοκληρωτικός Λογισμός-Θεωρία και Εφαρμογές, Εκδότης BROKEN HILL PUBLISHERS LTD.
2. Ντούνιας, Σ. (2005). Απειροστικός Λογισμός, Τόμος Β, Εκδ. Leader Books.