COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF INFORMATION SCIENCES & TECHNOLOGY
ACADEMIC UNIT	DEPARTMENT OF STATISTICS
LEVEL OF STUDIES	1st Cycle (UNDERGRADUATE)
COURSE CODE	**6041** **SEMESTER** **1**st
COURSE TITLE	**CALCULUS I**

INDEPENDENT TEACHING ACTIVITIES	**WEEKLY TEACHING HOURS**	**CREDITS**
	4	7.5

COURSE TYPE	CORE – General Background
PREREQUISITE COURSES:	
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK
IS THE COURSE OFFERED TO ERASMUS STUDENTS	NO
COURSE WEBSITE (URL)	https://www.dept.aueb.gr/en/stat-courses

(2) LEARNING OUTCOMES

Learning outcomes
At the end of the course, the students will be able to understand the concepts and techniques of differential and integral calculus and the properties of real numbers including convergence of real sequences and series.

General Competences
- Search for, analysis and synthesis of data and information, with the use of the necessary technology   - Decision-making   - Homework

(3) SYLLABUS

Axiomatic foundation of the system of real numbers. Axioms of domain and order, axiom of the least upper bound and the Archimedean property. Monotonic and bounded functions, continuity of a function, Bolzano's theorem, Mean-value theorem, extreme value theorem and uniform continuity. Elements of set theory, the system of real numbers. Derivative of a function, calculus of derivatives and derivatives of higher order, theorems Rolle, Mean-Value and L'Hospital, local extremes. Riemann's integral, properties of the integral (additivity, triangular inequality, linearity), continuity and differentiability of the integral function,

integrability of continuous functions, Mean-value theorem for integrals, indefinite integral of a function, Fundamental theorem of Infinitesimal Calculus. Techniques of integration (change of variable, integration by parts, etc.), logarithm and the exponential function, generalized integrals, examples and applications. Subsets of R, points of accumulation, sequences of real numbers, monotonic sequences, subsequences and the Cauchy criterion of convergence, Bolzano-Weierstrass theorem, theorems of sequence convergence. Series of real numbers, series with positive terms, criteria of convergence and absolute convergence of series. Taylor's theorem and Taylor series.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face to Face
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	YES

TEACHING METHODS	Activity	Semester workload
	Lectures	148.5
	Laboratory practice	13
	Tutorials	26
	Course total	*187.5*

STUDENT PERFORMANCE EVALUATION	WRITTEN EXAMINATION AT THE END OF THE SEMESTER

(5) ATTACHED BIBLIOGRAPHY

- Athanasiadis X.E.Giannakoulias E. Giotopoulos. (2010). General Mathematics, Calulus I, Symmetry.
- Spivak, M. (1991). Differentials and Integral Calculus. University of Crete
- Finney R.L., Weir M.D., and Giordano F.R. (2004). Calculus I, University of Crete
- Apostol, T. M. (1967). Calculus, Vol.1, 2nd edition, Wiley.