

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	1st
COURSE TITLE	Calculus I		
INDEPENDENT TEACHING ACTIVITIES		WEEKLY TEACHING HOURS	CREDITS
Lectures			
Workshops			
Labs			
COURSE TYPE	Compulsory - 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/content/calculus-%CE%B9-75-ects		

(2) LEARNING OUTCOMES

Learning outcomes
After the successful completion of the course, the students will have adequately understood elementary concepts and techniques of Infinite Calculus and will be able to use them in solving Probability and Statistics problems.
General Competences
• Search, analysis and synthesis of data and information, using the necessary technologies • Decision making • Autonomous work

(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. Derivative of a function, calculus of derivatives and derivatives of
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higher order, theorems of 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 $\mathbb{R}$, 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 <i>Face-to-face, Distance learning, etc.</i>	Face-to-face	
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	YES, for communication with the students	
TEACHING METHODS	Activity	Semester workload
	Class Lectures	148,5
	Laboratory exercises	13
	Tutorial	26
	Course Total	187.5
STUDENT PERFORMANCE EVALUATION	Written examination at the end of the semester. The instructor may additionally conduct a supplementary oral examination of a selected sample of students, based on an appropriate sampling procedure, the outcome of which is taken into account in determining the final grade.	

(5) ATTACHED BIBLIOGRAPHY

- Αθανασιάδης Χ.Ε, Γιαννακούλιας Ε., Γιωτόπουλος Σ.Χ. (2009). Γενικά Μαθηματικά, Απειροστικός Λογισμός, Τόμος 1, Εκδόσεις Συμμετρία.
- Spivak, M. (2010). Διαφορικός και Ολοκληρωτικός Λογισμός, 2η έκδοση, ΙΤΕ Πανεπιστημιακές Εκδόσεις Κρήτης.
- Finney R.L., Weir M.D., and Giordano F.R. (2004). Απειροστικός Λογισμός, τόμος Ι, Πανεπιστημιακές Εκδόσεις Κρήτης.
- Apostol, T. M. (1967). Calculus, Vol.1, 2nd edition, Wiley.