

COURSE OUTLINE

(1) GENERAL

SCHOOL	SCHOOL OF SCIENCES		
ACADEMIC UNIT	DEPARTMENT OF MATHEMATICS		
LEVEL OF STUDIES	UNDERGRADUATE PROGRAM		
COURSE CODE		SEMESTER	A
COURSE TITLE	CALCULUS I		
INSTRUCTOR	Konstantinos Gkikas		
INDEPENDENT TEACHING ACTIVITIES	WEEKLY TEACHING HOURS	CREDITS	
	6	9	
COURSE TYPE	General knowledge		
PREREQUISITE COURSES:	NO		
LANGUAGE OF INSTRUCTION and EXAMINATIONS:	GREEK		
IS THE COURSE OFFERED TO ERASMUS STUDENTS	YES		
COURSE WEBSITE (URL)	http://www.math.aegean.gr/index.php/en/academics/undergraduate-programs		

(2) LEARNING OUTCOMES

Learning outcomes
<p>The principal aim of the course is the study of real sequences and the calculus of functions of real variable. During the course, emphasis is given in the demonstration of these notions by a great variety of examples and exercises.</p> <p>After completing this course, students should demonstrate competency in the following skills:</p> <ul style="list-style-type: none"> • To understand and suitably apply the notion and theorems for the convergence of sequences. • To understand and suitably apply the notions and the calculus for functions of real variable (limit and continuity of functions, continuity in closed and bounded intervals, intermediate value theorem and applications, continuity of inverse functions-inverse trigonometric functions, function derivative, Rolle theorem, mean value theorem, indeterminate forms, L' Hospital rule, extreme values and inflection points of functions, function graph).
General Competences
Working independently. Team work. Working an interdisciplinary environment.

(3) SYLLABUS

<p>1a. Sequences and subsequences of real numbers, operations with sequences, examples of recursive sequences.</p> <p>1b. Monotonous sequences, monotony criteria</p> <p>1c. Bounded sequences</p> <p>1d. Sequences of zero limit ϵ-Definition and its negation. Zero sequences properties.</p> <p>1e. Convergent sequences ϵ-definition and its negation. Uniqueness of the limit Subsequence limit Convergent sequences properties</p>
--

<p>2a. Functions Polynomial, rational, algebraic, Trigonometric Exponential function (strict definition) Logarithmic function as inverse of exponential</p> <p>3a. function limits and one-sided limits Accumulation points and Isolated points Limit of a function Principle of transport</p> <p>3b. Continue functions Definition and negation Principle of transport Continuous function algebra Continuation of exponential, inverse (and therefore logarithmic) and trigonometric functions Maximum and minimum value theorem Intermediate value theorem</p> <p>4a. Derivative Definition Differentiation Rules Derivative of inverse function Higher order derivatives Exponential, logarithmic, and trigonometric derivative Inverse trigonometric, critical points, Rolle theorem, intermediate value theorem Indeterminate forms (L' Hospital)</p> <p>4b. Study of function</p>	
TEACHING MATERIAL DISTRIBUTION	The teaching material of the course is uniformly distributed during the semester.

(4) TEACHING and LEARNING METHODS - EVALUATION

DELIVERY	Face-to-face lectures										
USE OF INFORMATION AND COMMUNICATIONS TECHNOLOGY	Communication with students via e-mail										
TEACHING METHODS	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;"><i>Activity</i></th> <th style="text-align: center;"><i>Semester workload</i></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">Lectures</td> <td style="text-align: center;">52</td> </tr> <tr> <td style="text-align: center;">Tutorial</td> <td style="text-align: center;">26</td> </tr> <tr> <td style="text-align: center;">Independent Study</td> <td style="text-align: center;">147</td> </tr> <tr> <td style="text-align: center;">Course total (25 per ECTS)</td> <td style="text-align: center;">225</td> </tr> </tbody> </table>	<i>Activity</i>	<i>Semester workload</i>	Lectures	52	Tutorial	26	Independent Study	147	Course total (25 per ECTS)	225
<i>Activity</i>	<i>Semester workload</i>										
Lectures	52										
Tutorial	26										
Independent Study	147										
Course total (25 per ECTS)	225										
COURSE COMMITMENTS	Attending course and tutorial sessions is not obligatory.										
STUDENT PERFORMANCE EVALUATION	Student's evaluation is done in Greek through a written examination which includes short-answers questions and problem solving. For students with disabilities, evaluation takes place via oral exams.										

(5) ATTACHED BIBLIOGRAPHY

<ol style="list-style-type: none"> 1. Σ. Ντούγιας. Απειροστικός Λογισμός Τόμος Α. Εκδόσεις Leader Books, 2007. 2. T. M. Apostol. Calculus, Volume 1, One-variable calculus, with an introduction to linear algebra. Wiley, 1967 3. F. J. Ayres., E. Mendelson. Schaum's Outline of Calculus (Fourth Edition). Schaum's Outlines, 1999. 4. Θ. Ρασσιάς. Μαθηματικά Ι β έκδοση. Εκδόσεις Τσότρας, 2017.
--