

Course unit title:	Calculus I
Course unit code:	MAT101
Type of course unit: (Compulsory/optional)	Compulsory
Level of course unit: (First, second or third cycle)	Bachelor (1st cycle)
Year of study:	1
Semester when the unit is delivered:	1
Number of ECTS credits allocated:	7
Name of lecturer(s):	TBA
Learning outcomes of the course unit:	
<p>Upon successful completion of this course students should be able to:</p> <ul style="list-style-type: none"> • Recall the essential algebraic properties of functions • Evaluate the limit of a function • Calculate the derivative of a function using various techniques • Manipulate derivatives to solve real life problems • Use derivatives to describe the characteristics of the graph of a function • Recognize antidifferentiation as the reverse of the differentiation process and apply it in appropriate circumstances • Employ antiderivatives(integrals) in the solution of area problems 	
Mode of delivery:	Face- to- face
Prerequisites and co-requisites:	Consent of Instructor
Recommended optional program components:	None
Course Contents:	
Objective:	
<p>This course together with MAT102, provides a good working knowledge of calculus, a powerful mathematical instrument in engineering and science.</p>	
Description:	

The Cartesian Plane. The Distance Formula. Graphs. Circle. Parabola. Slope of a line. Angle of Inclination. Parallel and Perpendicular Lines. Equations of a Straight Line. Functions. Symmetry, Operations with Functions. Composite Functions. Trigonometric Functions.

Introduction to the Derivative. The Calculation of Limits. One-Sided Limits. The Limit Theorems. Infinite Limits and Limits at Infinity. Tangent Lines and Derivatives. Derivative at a Point. The Derivative Function. Differentiability on an Open Interval. The Derivative as a Rate of Change. Instantaneous Velocity. Continuity. Types of Discontinuity. Upper and Lower Bound Theorem. Intermediate Value Theorem. Differentiation Rules. The Product and Quotient Rules. The Derivative of Composite Functions: The Chain Rule. The Power Rule. The Derivative of a Power Function. The Derivatives of the Trigonometric Functions. Implicit Differentiation. Higher-Order Derivatives. Related Rates of Change.

The Mean Value Theorem. Elementary Curve Sketching I: Increasing and Decreasing Function and the First Derivative Test. Asymptotes. Elementary Curve Sketching II: Concavity and the Second Derivative Test. The Theory of Maxima and Minima. Maxima and Minima; Applied Optimization Problems. Indeterminate Forms and L'Hopital's Rule.

Antiderivatives. The Sigma-Notation. Approximations to Area. The Definite Integral.. Existence of Definite Integrals. The Fundamental Theorem of Calculus. Integration by Substitution. The Area Between Curves.

Recent developments and contemporary issues pertaining to the subject matter of the course.

**Recommended
or
required reading:**

Weir/Hass/Giordano., THOMAS' CALCULUS
Pearson/Addison Wesley

Grossman, S., CALCULUS, Academic Press

Ayres Jr., F., CALCULUS, Schaum's Series
McGraw Hill

Anton, H., CALCULUS WITH ANALYTIC GEOMETRY
Wiley

Sherlock/Roebuck/McGodfrey, CALCULUS
Edward Arnold

Ellis/Gulick, CALCULUS WITH ANALYTIC GEOMETRY
Academic Press

	Stein, S., CALCULUS AND ANALYTIC GEOMETRY McGraw Hill						
Planned learning activities and teaching methods:	<table border="0"> <tr> <td>Class Instruction</td> <td style="border: 1px solid black; text-align: center;">55 Hours</td> </tr> <tr> <td>Consultation</td> <td style="border: 1px solid black; text-align: center;">20 Hours</td> </tr> </table>	Class Instruction	55 Hours	Consultation	20 Hours		
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Consultation	20 Hours						
Assessment methods and criteria:	<table border="0"> <tr> <td>Examinations</td> <td style="border: 1px solid black; text-align: center;">95%</td> </tr> <tr> <td>Class participation</td> <td style="border: 1px solid black; text-align: center;">5%</td> </tr> <tr> <td></td> <td style="border: 1px solid black; text-align: center;">100%</td> </tr> </table>	Examinations	95%	Class participation	5%		100%
Examinations	95%						
Class participation	5%						
	100%						
Language of instruction:	English						
Work placement(s):	No						
Place of Teaching:	Regular Classroom European University Cyprus, Nicosia						