Calculus I | Faculty of Engineering

Course Code:

MATH 131

Course Period:

Autumn

Course Type:

Core

Credits:

4

Theoric:

3

Practice:

2

Laboratory Hour:

0

ECTS:

6

Course Language:

English

Course Objectives:

The aim of this course is to provide students with an understanding of limits, derivatives and integrals of functions of one variable and their calculations.

Course Content:

Functions. Limits and continuity. Derivatives. Rules of differentiation. Applications of derivatives; extreme values, sketching graphs of functions. Definite Integrals, the fundamental theorems of calculus. Methods of integration, areas of plane regions.

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Learning Outcomes	Teaching Methods	Assessment Methods
1) Knows the concepts of limits and continuity of functions of a single variable and performs related calculations.	1,2	A
2) Knows the concept of derivative and some of its applications and performs related calculations.	1,2	A
3) Knows the concepts of definite, indefinite and improper integrals and some of their applications and performs related calculations.	1,2	A

Week	Topics	Study Materials
1	Limits of functions, Limits at infinity and infinite limits	(From textbook) 1.2,1.3
2	Continuity, The formal definition of limit, Tangent lines and their slopes,	1.4,1.5,2.1
3	The derivative , Differentiation rules, The chain rule,	2.2,2.3,2.4
4	Derivatives of trigonometric functions, Higher order derivatives, The Mean-Value Theorem,	2.5,2.6,2.8
5	Implicit differentiation, Antiderivatives and Initial-Value Problems, Inverse functions, Exponential and logarithmic functions,	2.9,2.10,3.1,3.2
6	The natural logarithm and exponential, The inverse trigonometric functions,	3.3,3.5
7	Related rates , Indeterminate forms,	4.1,4.3
8	Extreme values, Concavity and inflections	4.4,4.5
9	Sketching the graph of a function, Extreme-value problems,	4.6,4.8
10	Linear approximations , Sums and sigma notation, Areas as limits of sums, The definite integral,	4.9,5.1,5.2,5.3
11	Properties of the definite integral, The Fundamental Theorem of Calculus	5.4,5.5

12	The method of substitution, Areas of plane regions	5.6,5.7
13	Integration by parts, Integrals of rational functions	6.1,6.2
14	Inverse substitutions, Improper integrals	6.3,6.5

Textbook	R. A. Adams and C. Essex, Calculus, 7th Ed., Pearson (2010)
Additional Resources	

Documents	
Assignments	
Exams	

IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	2	100
Quizzes	0	0
Assignments	0	0
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		**100**

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5
1	The ability to make computation on the basic topics of mathematics such as limit, derivative, integral, logic, linear algebra and discrete mathematics which provide a basis for the fundamenral research fields in mathematics (i.e., analysis, algebra, differential equations and geometry)					**X**
2	Acquiring fundamental knowledge on fundamental research fields in mathematics					**X**
3	Ability form and interpret the relations between research topics in mathematics			**X**		

4	Ability to define, formulate and solve mathmatical problems					**X**
5	Consciousness of professional ethics and responsibilty	**X**				
6	Ability to communicate actively					
7	Ability of self-development in fields of interest					**X**
8	Ability to learn, choose and use necessary information technologies					
9	Lifelong education					

Activities	**Quantity**	**Duration (Hour)**	**Total Workload (Hour)**
Course Duration (14x Total course hours)	14	5	70
Hours for off-the-classroom study (Pre-study, practice)	14	3	42
Mid-terms (Including self study)	2	8	16
Quizzes			
Assignments			
Final examination (Including self study)	1	12	12
Total Work Load			140
Total Work Load / 25 (h)			5.6
ECTS Credit of the Course			6