TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Industrıal Engıneerıng (Englısh)

Course Information

MATHEMATICS I					
Code	**Semester**	**Theoretical**	**Practice**	**National Credit**	**ECTS Credit**
		Hour / Week			
MAT103	Fall	4	0	4	6

Prerequisites and co-requisites	None
Language of instruction	English
Type	Required
Level of Course	Bachelor's
Lecturer	Asst.Prof. Dr. Türker Ertem
Mode of Delivery	Face to Face
Suggested Subject	None
Professional practise (internship)	None
Objectives of the Course	The sequence MAT 103-104 is the standard complete introduction to the concepts and methods of calculus. It is taken by all engineering students. The emphasis is on concepts, solving problems, theory and proofs. All sections are given a uniform midterm and a final exam. Students will develop their reading, writing and questioning skills in mathematics.
Contents of the Course	Functions. Limits and Continuity. Tangent lines and derivatives. Chain rule. Implicit differentiation. Inverse functions. Related rates. Linear approximations. Extreme values. Mean Value Theorem and its applications. Sketching graphs. Indeterminate forms and L'Hospital's rules. Definite integral. Fundamental Theorem of Calculus. Substitution. Areas between curves. Formal definition of natural logarithm function. Techniques of integration. Improper integrals. Arc length. Volumes and surface areas of solids of revolution. Parametric plane curves. Polar coordinates. Arc length in polar coordinates.

Learning Outcomes of Course

#	Learning Outcomes
1	Students will be able to compute limits and to carry out some basic proofs about limits and continuty.
2	Students will be able to compute derivates and to use it in applications such as computing rates of change, finding extreme values.
3	Students will be able to sketch graphs of functions by finding intervals of increase /decrease, concavity and asymptotes.
4	Students will be able to use transcendental functions including logarithms, exponentials and inverse trigonometric functions effectively.
5	Students will be able to compute integrals by the Riemann Sum defintion and use it to make approximations.
6	Students will be able to make use of various techniques to compute proper and improper integrals.
7	Students will be able to use integration to compute area, volume, arc lenght and surface area.
8	Students will be able to make and to use parametrizations of plane curves in Cartesian an polar coordinates.

Course Syllabus

#	Subjects	Teaching Methods and Technics
1	Ch 0: Preliminaries 0.1 Real Numbers and the Real Line 0.2 Cartesian Coordinates in the Plane 0.3 Graphs of Quadratic Equations 0.4 Functions and Their Graphs 0.5 Combining Functions to Make New Functions 0.6 Polynomials and Rational Functions 0.7 The Trigonometric Functions	lecturing, discussing, problem solving

2	Ch 1: Limits and Continuity 1.2 Limits of Functions 1.3 Limits at Infinity and Infinite Limits 1.4 Continuity	lecturing, discussing, problem solving
3	1.4 Continuity 1.5 The Formal Definition of Limit Ch 2: Differentiation 2.1 Tangent Lines and Their Slope 2.2 The Derivative 2.3 Differentiation Rules	lecturing, discussing, problem solving
4	2.4 The Chain Rule 2.5 Derivatives of Trigonometric Functions 2.6 Higher-Order Derivatives 2.8 The Mean-Value Theorem	lecturing, discussing, problem solving
5	2.9 Implicit Differentiation Ch 3: Transcendental Functions 3.1 Inverse Functions 3.2 Exponential and Logarithmic Functions	lecturing, discussing, problem solving
6	3.3 The Natural Logarithm and Exponential 3.5 The Inverse Trigonometric Functions 3.6 Hyperbolic Functions	lecturing, discussing, problem solving
7	Ch 4: More Applications of Differentiation 4.1 Related Rates 4.3 Indeterminate Forms 4.4 Extreme Values 4.5 Concavity and Inflections	lecturing, discussing, problem solving
8	4.6 Sketching the Graph of a Function	lecturing, discussing, problem solving
9	4.8 Extreme-Value Problems 4.9 Linear Approximations	lecturing, discussing, problem solving
10	Ch 5: Integration 5.1 Sums and Sigma Notation 5.2 Areas as Limits of Sums 5.3 The Definite Integral 5.4 Properties of the Definite Integral	lecturing, discussing, problem solving
11	5.5 The Fundamental Theorem of Calculus 5.6 The Method of Substitution 5.7 Areas of Plane Regions	lecturing, discussing, problem solving
12	Ch 6: Techniques of Integration 6.1 Integration by Parts 6.2 Integrals of Rational Functions	lecturing, discussing, problem solving
13	6.3 Inverse Substitutions 6.5 Improper Integrals	lecturing, discussing, problem solving
14	Ch 7: Applications of Integration 7.1 Volumes by Slicing—Solids of Revolution 7.2 More Volumes by Slicing 7.3 Arc Length and Surface Area	lecturing, discussing, problem solving
15		
16	Final Exam	

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	Robert A. Adams, Christopher Essex Calculus: A Complete Course, 7th Edition		
2	Stewart J. Calculus, 5th Edition		

3	George B. Thomas Jr., Maurice D. Weir, Joel R. Hass Thomas' Calculus, 12th Edition.		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	60%	Final Exam	Final Exam

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	Students will be able to compute limits and to carry out some basic proofs about limits and continuty.	1,7	1,2
2	Students will be able to compute derivates and to use it in applications such as computing rates of change, finding extreme values.	1,7	1,2
3	Students will be able to sketch graphs of functions by finding intervals of increase /decrease, concavity and asymptotes.	1,7	1,2
4	Students will be able to use transcendental functions including logarithms, exponentials and inverse trigonometric functions effectively.	1,7	1,2
5	Students will be able to compute integrals by the Riemann Sum defintion and use it to make approximations.	1,7	1,2
6	Students will be able to make use of various techniques to compute proper and improper integrals.	1,7	1,2
7	Students will be able to use integration to compute area, volume, arc lenght and surface area.	1,7	1,2
8	Students will be able to make and to use parametrizations of plane curves in Cartesian an polar coordinates.	1,7	1,2

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	4	56
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	5	70
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0
7	Preparation for Midterm Exam	1	8	8
8	Midterm Exam	1	2	2
9	Quiz	0	0	0
10	Homework	0	0	0
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	1	12	12
16	Final Exam	1	2	2
				150