



**T.C. ESKİŞEHİR OSMANGAZI UNIVERSITY  
ENGINEERING AND ARCHITECTURE FACULTY  
MECHANICAL ENGINEERING DEPARTMENT**

**COURSE INFORMATION FORM**

<b>SEMESTER</b>	<b>FALL</b>
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<b>COURSE CODE</b>	151811213	<b>COURSE NAME</b>	CALCULUS I
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SEMESTER	WEEKLY COURSE PERIOD			COURSE OF			
	Theory	Practice	Labratory	Credit	ECTS	TYPE	LANGUAGE
1	4	0	0	4	5	COMPULSORY (X) ELECTIVE ( )	ENGLISH

**COURSE CATAGORY**

Basic Science	Basic Engineering	Mechanical Engineering Profession [if it contains considerable design, mark with (√) ]	Social Science
X			

**ASSESSMENT CRITERIA**

	Evaluation Type	Quantity	%
	<b>MID-TERM</b>	1st Mid-Term	1
2nd Mid-Term			
Quiz			
Homework			
Project			
Report			
Others (.....)			
<b>FINAL EXAM</b>		1	%50

<b>PREREQUIEITE(S)</b>	none
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<b>COURSE DESCRIPTION</b>	An intensive course in the calculus of one variable including limits; differentiation; maxima and minima, and the chain rule for polynomials, rational functions, trigonometric functions, and exponential functions. Introduction of integration and techniques
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<b>COURSE OBJECTIVES</b>	To provide the basic mathematical skills required of engineering students
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<b>ADDITIVE OF COURSE TO APPLY PROFESSIONAL EDUATION</b>	Basic mathematical knowledge and ability to apply engineering applications
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<b>COURSE OUTCOMES</b>	<ol style="list-style-type: none"> <li>1. Appreciation of the scope, usefulness, beauty and elegance of mathematics,</li> <li>2. Gaining the ability to reason in a broad range of mathematical contexts</li> <li>3. Gaining skills in applying mathematical techniques to the solution of practical problems</li> <li>4. Understanding of the key concepts of calculus and the ability to differentiate and integrate a range of functions</li> </ol>
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<b>TEXTBOOK</b>	Thomas, Weir, Hass, Giardino, Thomas' Calculus, 11 <sup>th</sup> Ed., Addison & Wesley Publication. 2009
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<b>OTHER REFERENCES</b>	F. Ayres, Differential and Integral Calculus, Schaum Series. 1984
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<b>TOOLS AND EQUIPMENTS REQUIRED</b>	Course Management System (Moodle) is incoporated into the external course tools.
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COURSE SYLLABUS	
WEEK	TOPICS
1	Basic concepts. Functions, polynomials, trig-functions, rational functions. Sided Limits, limits at infinity
2	Derivative and continuity. Definitions. Basic properties of differentiation. Derivative of polynomials, trig, log and exponential functions
3	Hyperbolic functions and its derivatives. Inverse functions (inverse trig and hyperbolic functions) and their derivatives
4	Indeterminate forms and L'hospital's rule. Implicit differentiation.
5	First/Second derivative tests. Local extremum and concavity. Sketching functions
6	Critical points and types. Related rates problems. Maximum/minimum, optimization problems.
7	Sketching circle, ellipse, hyperbola and parabolas. Parametric equations. Derivative of parametric equations. Velocity and acceleration.
8	Mid-Term Examination
9	Indefinite integral. Rules. Integrals of polynomials, trig, hyperbolic and exponential functions.
10	Trig substitutions.
11	Integration by parts, method of partial fractions
12	Definite integration, Improper Integrals, Leibnitz's rule
13	Linear Algebra, matrices, inverse matrice, Gauss-elimination,
14	Solution of system of linear equations, determinants
15,16	Final Exams

NO	PROGRAM OUTCOMES	3	2	1
1	Sufficient knowledge of engineering subjects related with mathematics, science and own branch; an ability to apply theoretical and practical knowledge on solving and modeling of engineering problems.	X		
2	Ability to determine, define, formulate and solve complex engineering problems; for that purpose an ability to select and use convenient analytical and experimental methods.		X	
3	Ability to design a complex system, a component and/or an engineering process under real life constrains or conditions, defined by environmental, economical and political problems; for that purpose an ability to apply modern design methods.			X
4	Ability to develop, select and use modern methods and tools required for engineering applications; ability to effective use of information technologies.	X		
5	In order to investigate engineering problems; ability to set up and conduct experiments and ability to analyze and interpretation of experimental results.			X
6	Ability to work effectively in inner or multi-disciplinary teams; proficiency of interdependence.			X
7	Ability to communicate in written and oral forms in Turkish/English; proficiency at least one foreign language.		X	
8	Awareness of life-long learning; ability to reach information; follow developments in science and technology and continuous self-improvement.		X	
9	Understanding of professional and ethical issues and taking responsibility			X
10	Awareness of project, risk and change management; awareness of entrepreneurship, innovativeness and sustainable development.			X
11	Knowledge of actual problems and effects of engineering applications on health, environment and security in global and social scale; an awareness of juridical results of engineering solutions.			X
1:None. 2:Partially contribution. 3: Completely contribution.				

**Instructor(s):** Prof. Dr. Zekeriya ALTAÇ

**Signature**

**Date:** 01.11.2021