



	Course Name: MATH 101 Calculus I		Departments: Computer, Electrical Electronic, Mechanical, Metallurgical and Materials, Energy Systems, Industrial, Civil, Aerospace Engineering				Semester
							1
	Methods of Education						Credit (ECTS)
	Lecture	Recitation	Lab	Project/Field Study	Homework	Other	Total
56	45		19	60		180	
Language	English						
Compulsory/Elective	Compulsory						
Prerequisites	None						
Course Contents	<b>Weeks</b>	<b>Subjects</b>					
	1	<b>P Preliminaries</b>					
	2	<b>1 Limits and Continuity</b> <ul style="list-style-type: none"> <li>1.2 Limits of Functions</li> <li>1.3 Limits at Infinity and Infinite Limits</li> <li>1.4 Continuity</li> </ul>					
	3	<b>2 Differentiation</b> <ul style="list-style-type: none"> <li>2.1 Tangent Lines and Their Slopes</li> <li>2.2 The Derivative</li> <li>2.3 Differentiation Rules</li> </ul>					
	4	<ul style="list-style-type: none"> <li>2.4 The Chain Rule</li> <li>2.5 Derivatives of Trigonometric Functions</li> <li>2.6 Higher-Order Derivatives</li> </ul>					
	5	<ul style="list-style-type: none"> <li>2.7 Using Differentials and Derivatives</li> <li>2.8 The Mean-Value Theorem</li> <li>2.9 Implicit Differentiation</li> </ul>					
	6	<b>3 Transcendental Functions</b> <ul style="list-style-type: none"> <li>3.1 Inverse Functions</li> <li>3.2 Exponential and Logarithmic Functions</li> <li>3.3 The Natural Logarithm and Exponential</li> </ul>					
	7	<ul style="list-style-type: none"> <li>3.4 Growth and Decay</li> <li>3.5 The Inverse Trigonometric Functions</li> <li>3.6 Hyperbolic Functions</li> </ul>					
	8	<b>4 More Applications of Differentiation</b> <ul style="list-style-type: none"> <li>4.1 Related Rates</li> <li>4.3 Indeterminate Forms</li> <li>4.4 Extreme Values</li> </ul>					
	9	<ul style="list-style-type: none"> <li>4.5 Concavity and Inflections</li> <li>4.6 Sketching the Graph of a Function</li> <li>4.8 Extreme-Value Problems</li> <li>4.9 Linear Apprpximations</li> </ul>					
	10	<b>5 Integration</b> <ul style="list-style-type: none"> <li>5.1 Sums and Sigma Notation</li> <li>5.2 Areas as Limits of Sums</li> <li>5.3 The definite Integral</li> </ul>					
	11	<ul style="list-style-type: none"> <li>5.4 Properties of the Definite Integral</li> <li>5.5 The Fundamental Theorem of Calculus</li> <li>5.6 The Method of Substitution</li> </ul>					

	12	<ul style="list-style-type: none"> <li>5.7 Areas of Plane Regions</li> </ul> <b>6 Techniques of Integration</b> <ul style="list-style-type: none"> <li>6.1 Integration by Parts</li> </ul>	
	13	<ul style="list-style-type: none"> <li>6.2 Integrals of Rational Functions</li> <li>6.3 Inverse Substitutions</li> </ul>	
	14	<ul style="list-style-type: none"> <li>6.5 Improper Integrals</li> </ul>	
Course Objectives	<ol style="list-style-type: none"> <li>To provide the concepts of functions, limits, continuity, differentiation, and integration</li> <li>To provide the knowledge of applications of differentiation and integration</li> <li>To give an ability to apply knowledge of mathematics on engineering problems</li> </ol>		
Learning Outcomes and Competences	<p>Student, who passed the course satisfactorily can</p> <ol style="list-style-type: none"> <li>compute the limit of various functions, use the concepts of the continuity, use the rules of differentiation to differentiate functions</li> <li>sketch the graph of a function using asymptotes, critical points and the derivative test for increasing/decreasing and concavity properties.</li> <li>solve max/min problems and use differentiation to solve them</li> <li>evaluate integrals by using the Fundamental Theorem of Calculus</li> <li>apply integration to compute areas and volumes, volumes of revolution and arc lengths</li> <li>learn transcendental functions and evaluate integrals using techniques of integration</li> </ol>		
Textbook and /or References	<p><b>Textbook:</b> Calculus, A Complete Course, Ninth Edition, Robert A. Adams, Christopher Essex, Publisher: Pearson, 2018.</p> <p><b>References:</b></p> <ol style="list-style-type: none"> <li>Thomas' Calculus 13th Edition by George B. Thomas Jr., Maurice D. Weir and Joel R. Hass, Publisher: Pearson, 2014.</li> <li>Calculus 8th Ed. by James Stewart (Author) Publisher: Cengage Learning.</li> </ol>		
Assessment Criteria		If any, mark as (X)	Percentage (%)
	Midterm Exams	X	40
	Quizzes		
	Homework		
	Projects		
	Term Paper		
	Laboratory work		
	Other		
	Final Exam	X	60
Instructors			