

<b>Course Title</b>	<b>Math Deficiency – II</b>		
<b>Course Code</b>	<b>MD-002</b>		
<b>Credit Hours</b>	3*		
<b>Category</b>	Mathematics & Supporting (Deficiency Course)		
<b>Prerequisite</b>	None		
<b>Co-Requisite</b>	None		
<b>Follow Up</b>	GE-162 Calculus & Analytic Geometry		
<b>Course Learning Outcomes (CLOs)</b>	At the end of the course, the students will be able to:	<b>BT</b>	<b>PLO</b>
	CLO1: Know the concepts and applications of complex number, sequences, series, permutations and combinations, integration and differentiation	C1 (Know)	1
	CLO2: Describe functions, limit, continuity chain rule and related techniques.	C2 (Describe)	1
	CLO3: Identify and solve problems related to differentiation and integration.	C3 (Apply)	1,3
<b>Course Description</b>	<p><b>Complex Numbers:</b> Complex Numbers, Arithmetic with Complex Numbers (Add, subtract, multiply and divide complex numbers), Trigonometric Polar Form of Complex Numbers, De Moivre's Theorem and nth Roots, Recursion. <b>Sequences and Series:</b> Sigma Notation, Arithmetic Series, Geometric Series (Sum infinite and finite geometric series and categorize geometric series). <b>Counting with Permutations and Combinations. Basic Probability. Binomial Theorem. Limit:</b> Notation, Graphs to Find Limits, Tables to Find Limits, Substitution to Find Limits, Rationalization to Find Limits, One Sided Limits and Continuity. <b>Rate of Change:</b> Instantaneous Rate of Change, Tangent Lines and Rates of Change. <b>Derivatives:</b> The Derivative Function, Introduction to Techniques of Differentiation, The Product and Quotient Rules, Derivatives of Trigonometric Functions, The Chain Rule, Derivatives of Logarithmic Functions, Derivatives of Exponential and Inverse Trigonometric Functions. Increase, Decrease, and Concavity, Relative Extrema, Absolute Maxima and Minima. <b>Integrals:</b> An Overview of the Area Problem, Area Under a Curve, The Indefinite Integral, Integration by Substitution, The Definition of Area as a Limit; Sigma Notation, The Definite Integral.</p>		
<b>Text Book(s)</b>	<ol style="list-style-type: none"> <li>1. Textbook of Algebra and Trigonometry Class XI is published by Punjab Textbook Board (PTB) Lahore, Pakistan.</li> <li>2. Calculus and Analytic Geometry, MATHEMATICS 12 (Mathematics FSc Part 2 or HSSC-II), Punjab Text Book Board Lahore, Pakistan</li> </ol>		
<b>Reference Material</b>	<ol style="list-style-type: none"> <li>1. Mark J. Christensen, Computing for Calculus, 1st Edition, Academic Press, (1st January 1981), 240 pages, ISBN: 9781483271088.</li> <li>2. Lay, L. D. 2015. Probability and Statistics for Engineering and the Sciences, 9th Ed. Cengage Learning, Boston, MA, USA.</li> <li>3. Howard, Anton, Irl Bivens, Stephen Davis, Calculus, 11th Ed, 2011, John Wiley &amp; Sons, Inc. (1318 Pages)</li> </ol>		