Department of Data Science, University of the Punjab,
Quaid-e-Azam Campus, Lahore, Pakistan
Course Outline

<table>
<tr><td>Program</td><td colspan="2">BS Data Science</td></tr>
<tr><td>Course Code</td><td colspan="2">DS-1XX</td></tr>
<tr><td>Course Title</td><td colspan="2">Pre-Calculus I</td></tr>
<tr><td rowspan="2">Credit Hours</td><td>Theory</td><td>Lab</td></tr>
<tr><td>3</td><td>0</td></tr>
<tr><td>Lecture Duration</td><td colspan="2">90 minutes (1.5 Hours), 2 lectures per week</td></tr>
<tr><td>Semester</td><td colspan="2">1</td></tr>
<tr><td rowspan="2">Pre-requisites</td><td>Courses</td><td>Knowledge</td></tr>
<tr><td>Nil</td><td>Nil</td></tr>
<tr><td>Follow Up Courses</td><td colspan="2">DS-2XX Pre-Calculus II</td></tr>
<tr><td>Aims and Objectives</td><td colspan="2">

Understand the basic concept of set theory
Learn about the functions and their properties
Learn how to find the optimized solution of various types of functions
Learn several techniques to find the solution of a system of equations
Understand the basic concept of matrix and matrix notations
How to perform matrix operations and use matrices to solve problems
Basic concept of determinant, how to find the determinant of a matrix and properties of determinant
Understand the basic idea of trigonometry and trigonometric identities
Learn about the basic concept of conic sections and equations in parametric and polar form
Learn basic trigonometric functions, inverse trigonometric functions

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	and solving trigonometric equations
Syllabus	*Defining Set, various types of set representation and operations, Relation and function, Graphical transformation of one and two dimensional functions, Properties of functions, composition and inverses of functions, domain and range of the functions, Maximum and minimum values of functions, increasing and decreasing functions, zeros and intercept of functions, piecewise functions, continuity and Discontinuity of functions, Polynomials and rational functions, Polynomial long division and Synthetic division, Solution of rational functions, Absolute valued function, properties of absolute valued functions, Asymptotes (Horizontal, vertical and oblique), Exponential functions and their properties, Logs functions and their properties, Systems of Two Equations and Two Unknowns, Systems of Three Equations and Three Unknowns, Matrix Algebra (Add, subtract and multiply matrices), Row Operations and Row Echelon Forms, Augmented Matrices, Determinant of Matrices (2 x 2 and higher order matrices), Cramer's Rule, Inverse Matrices, Series and Sequences, Trigonometry, Angles in Radians and Degrees, Right Triangle Trigonometry, Law of Cosines & Sines, Area of Triangle, Graphs of Other Trigonometric Functions , Graphs of Inverse Trigonometric Functions, Basic Trigonometric Identities (Pythagorean, Sum and Difference, Double, Half, and Power Reducing), Trigonometric Equations, General Form of a Conic, Parabolas, Circles, Ellipses, Hyperbolas, Degenerate Conics, Polar and Parametric Equations, Polar and Rectangular Coordinates.*
Contents	Defining Set, various types of set representation and operations, Relation and function, Graphical transformation of one and two dimensional functions, Properties of functions, composition and inverses of functions, domain and range of the functions, Maximum and minimum values of

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<tr><td></td><td colspan="4">functions, increasing and decreasing functions, zeros and intercept of functions, piecewise functions, continuity and Discontinuity of functions, Polynomials and rational functions, Polynomial long division and Synthetic division, Solution of rational functions, Absolute valued function, properties of absolute valued functions, Asymptotes (Horizontal, vertical and oblique), Exponential functions and their properties, Logs functions and their properties, Systems of Two Equations and Two Unknowns, Systems of Three Equations and Three Unknowns, Matrix Algebra (Add, subtract and multiply matrices), Row Operations and Row Echelon Forms, Augmented Matrices, Determinant of Matrices (2 x 2 and higher order matrices), Cramer’s Rule, Inverse Matrices, Series and Sequences, Trigonometry, Angles in Radians and Degrees, Right Triangle Trigonometry, Law of Cosines & Sines, Area of Triangle, Graphs of Other Trigonometric Functions , Graphs of Inverse Trigonometric Functions, Basic Trigonometric Identities (Pythagorean, Sum and Difference, Double, Half, and Power Reducing), Trigonometric Equations, General Form of a Conic, Parabolas, Circles, Ellipses, Hyperbolas, Degenerate Conics, Polar and Parametric Equations, Polar and Rectangular Coordinates.</td></tr>
<tr><td rowspan="3">Assessment and Examinations</td><td>Sr. #</td><td>Elements</td><td>Weightage</td><td>Details</td></tr>
<tr><td>1</td><td>Formative Assessment</td><td>25%</td><td>It is continuous assessment. It includes: classroom participation, attendance, assignments and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.</td></tr>
<tr><td>2</td><td>Midterm Assessment</td><td>35%</td><td>It takes place at the mid-point of the semester.</td></tr>
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	3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.
Textbooks	• *Algebra and Trigonometry, MATHEMATICS 11 (Mathematics FSc Part 1 or HSSC-I), Punjab Text Book Board Lahore, Pakistan* • *Calculus and Analytic Geometry, MATHEMATICS 12 (Mathematics FSc Part 2 or HSSC-II), Punjab Text Book Board Lahore, Pakistan*			
Reference Material/Suggested Readings	• *Gilbert, S. S., B. C. Andy and B. Andrew, B. 2005. Linear Algebra and Its Applications. 4th Ed. Thomson Brooks/Cole, Belmont, CA, USA.* • *Chung, S. K. 2014. Understanding basic calculus. Create Space Independent Publishing Platform, 173-175.* • *Howard Anton, Irl Bivens, Stephen Davis, Calculus, 10th Ed,2011, John Wiley & Sons, Inc. (1318 Pages)*			
Notes	• *Academic integrity is expected of all students. Plagiarism or cheating in any assessment will result in at least an F grade in the course and possibly more severe penalties.* • *You bear all the responsibility for protecting your assignments from plagiarism. If anyone else submits your assignment or uses your content in his/her assignment, you will be considered equally responsible.* • *The instructor reserves the right to modify the grading*			

	scheme/marks division and course outline during the semester. • *There is no makeup for missed sessional grading instruments like quizzes, assignments, and homework's.*