

**Course Title:** Introductory Mathematics

**Type:** Natural Sciences(General Education )

**Offering:** Undergraduate Degrees (including Associate Degrees)

**Prerequisites:** Nil

**Placement:** 1-4 Semesters

**Credit Hours:** 3 (3 + 0)

**Course Objectives:** Upon successful completion of this course, students will be able to:

- Understand the concepts of linear and quadratic equations, as well as exponential functions, and adeptly interpret their graphical representations.
- Develop a solid comprehension of fundamental matrix algebra and elementary trigonometry.
- Analyze and employ a diverse range of functions within mathematical applications.

**Course Contents:**

**Linear Equations and Inequalities:** Linear equation, gradient of linear equation, solving equations, inequalities, and systems of equations and inequalities, linear model in economics, supply and demand curve, linear equations in more than two variables, and system of linear equations, exponential growth and decay, linear vs. exponential, doubling time and half-life, real population growth.

**Quadratic Equations:** Definition of quadratic equation and examples, nature of roots of quadratic equations, solving quadratic equations by different methods(factorisation, completing the square, quadratic formula, graphs), solving simultaneous equations.

**Sequence and Series:** Arithmetic progression, geometric progression, harmonic progression. sum to n terms of arithmetic, geometric and harmonic sequences.

**Matrix Algebra:** Definition of a matrix, matrix operations, different types of matrices, special functions of square matrices( trace of a matrix, determinant, inverse of a matrix, nonsingular square matrix), matrix row operations, rank of a matrix, linear systems of two equations and two unknowns, linear systems of three equations and three unknowns, determinant of matrices (2 x 2 and higher order matrices), Cramer's rule.

**Trigonometry:** Trigonometric functions, inverse trigonometric functions, trigonometric ratios, even and odd trigonometric functions, trigonometric angles, applications of trigonometry.

**Recommended Books:**

1. Anton, H. and Rorres, C., *Elementary Linear Algebra, Applications Version*, John Wiley and Sons Inc. 12th edition, 2019.
2. Beveridge, R. W. *College Algebra and Trigonometry*, Richard W. Beveridge, 2018.
3. Kolman, B., A. Shapiro and M. Levitan, *College Algebra*, Horizon Textbook Publishing, 4th edition, 2006.
4. Stewart, J., Redlin, R. and Watson, S., *Algebra and Trigonometry*, 4th edition, Cengage Learning, 2016.