Foundations of Algebra

Course Description:

This course is designed to provide students with a thorough understanding of the essential concepts in arithmetic, algebra, and trigonometry, laying a strong foundation for more advanced studies in mathematics. It prepares students for the Linear Algebra course by covering fundamental topics and ensuring proficiency in algebraic and geometric skills. Through a combination of lectures, problem-solving sessions, and practical applications, students will develop the necessary mathematical background to succeed in higher-level mathematics courses.

Course Outline:

1. **Basic Arithmetic and Algebra**
   - *Operations with real numbers*
   - *Properties of numbers*
   - *Algebraic expressions (Linear equalities and inequalities)*
2. **Polynomials**
   - *Absolute value equations and inequalities*
   - *Quadratic equations*
   - *Operations with polynomials*
   - *Factoring polynomials*
   - *Solving polynomial equations*
3. **Functions and Graphs**
   - *Understanding functions*
   - *Types of functions*
   - *Graphing functions*
   - *Inverse functions*
4. **Exponents and Logarithms**
   - *Laws of exponents*
   - *Simplifying expressions with exponents*
   - *Understanding logarithms*
   - *Solving exponential and logarithmic equations*
5. **Basic Geometry and Trigonometry**
   - *Geometric shapes and properties*

- *Basics of trigonometric functions*
- *Pythagorean theorem*
- *Solving right triangles*
- *Trigonometric identities and equations*

Learning Outcomes:

By the end of this course, students will:

1. Have a comprehensive understanding of basic arithmetic and algebraic operations.
2. Be proficient in solving linear, quadratic, and absolute value equations and inequalities.
3. Understand and graph different types of functions and find their inverses.
4. Perform operations with polynomials and solve polynomial equations.
5. Apply the laws of exponents and logarithms to simplify expressions and solve equations.
6. Understand the properties of geometric shapes and apply trigonometric functions to solve problems involving right triangles.

Assessment Methods:

1. Homework assignments
2. Quizzes
3. Midterm and final exams
4. Projects and presentations on practical applications
5. Participation in class discussions and problem-solving sessions

Instructional Methods:

1. Lectures and interactive discussions
2. Hands-on practice and problem-solving sessions
3. Group projects and collaborative learning
4. Use of mathematical software for simulations and visualizations