

*University at Buffalo*  
**GIFTED MATH PROGRAM**

**Course IV Curriculum**

Textbook: Blitzer, *Pre-Calculus*, 3<sup>rd</sup> edition, Prentice-Hall, 2007.

**Chapter P: PREREQUISITES: FUNDAMENTAL CONCEPTS OF ALGEBRA**

Algebraic Expressions and Real Numbers; Exponents and Scientific Notation; Radicals and Rational Exponents; Polynomials; Factoring Polynomials; Rational Expressions; Equations; Modeling with Equations; Linear Inequalities and Absolute Value Inequalities

**Chapter 1: FUNCTIONS AND GRAPHS**

Graphs and Graphing Utilities; Basics of Functions and Their Graphs; Linear Functions and Slope; Transformations of Functions; Combinations of Functions; Composite Functions; Inverse Functions; Distance and Midpoint Formulas; Circles; Modeling with Functions

**Chapter 2: POLYNOMIAL AND RATIONAL FUNCTIONS**

Complex Numbers; Quadratic Functions; Polynomial Functions and Their Graphs; Dividing Polynomials; Remainder and Factor Theorems; Zeros of Polynomial Functions; Rational Functions and Their Graphs; Polynomial and Rational Inequalities; Modeling Using Variation

**Chapter 3: EXPONENTIAL AND LOGARITHMIC FUNCTIONS**

Exponential Functions; Logarithmic Functions; Properties of Logarithms; Exponential and Logarithmic Equations; Exponential Growth and Decay; Modeling Data

**Chapter 4: TRIGONOMETRIC FUNCTIONS**

Angles and Radian Measure; Trigonometric Functions: The Unit Circle; Right Triangle Trigonometry; Trigonometric Functions of Any Angle; Graphs of Sine and Cosine Functions; Graphs of Other Trigonometric Functions; Inverse Trigonometric Functions; Applications of Trigonometric Functions

**Chapter 5: ANALYTIC TRIGONOMETRY**

Verifying Trigonometric Identities; Sum and Difference Formulas; Double-Angle, Power-Producing, and Half-Angle Formulas; Product-to-Sum and Sum-to-Product Formulas; Trigonometric Equations

**Chapter 6: ADDITIONAL TOPICS IN TRIGONOMETRY**

The Law of Sines; The Law of Cosines; Polar Coordinates; Graphs of Polar Equations; Complex Numbers in Polar Form; DeMoivre's Theorem; Vectors; The Dot Product

**Chapter 7: SYSTEMS OF EQUATIONS AND INEQUALITIES**

Systems of Linear Equations in Two Variables; Systems of Linear Equations in Three Variables; Partial Fractions; Systems of Nonlinear Equations in Two Variables; Systems of Inequalities; Linear Programming

**Chapter 8: MATRICES AND DETERMINANTS**

Matrix Solutions to Linear Systems; Inconsistent and Dependent Systems and Their Applications; Matrix Operations and Their Applications; Multiplicative Inverses of Matrices and Matrix Equations; Determinants and Cramer's Rule

**Chapter 9: CONIC SECTIONS AND ANALYTIC GEOMETRY**

Parametric Equations; Conic Sections in Polar Coordinates