

Comprehensive Pre-Calculus/Trigonometry

COURSE DESCRIPTION: Pre-calculus weaves together previous study of algebra, geometry, and functions into a preparatory course for calculus. The course focuses on the mastery of critical skills and exposure to new skills necessary for success in subsequent math courses. Topics include linear, quadratic, exponential, logarithmic, radical, polynomial, and rational functions; systems of equations; and conic sections in the first semester. The second semester covers trigonometric ratios and functions; inverse trigonometric functions; applications of trigonometry, including vectors and laws of cosine and sine; polar functions and notation; and arithmetic of complex numbers.

Cross-curricular connections are made throughout the course to calculus, art, history, and a variety of other fields related to mathematics.

PREREQUISITES: Geometry and MTH303: Algebra II (or equivalents)

COURSE LENGTH: Two Semesters

REQUIRED TEXT: None

MATERIALS LIST: Texas Instruments T1-84 Plus graphing calculator is recommended.

COURSE OUTLINE:

Semester 1

Unit 1: Functions

- What is a Function?
- Graphing Functions
- Linear Functions
- Arithmetic Sequences and Series
- Linear Equations and Inequalities
- Linear Systems
- Arithmetic of Functions

Unit 2: Quadratic Functions

- Forms of Quadratic Functions
- Graphing Quadratic Functions

- Transformations
- Solving Quadratic Equations
- Applications of Quadratic Functions

Unit 3: Polynomial and Rational Functions

- Polynomial Expressions
- Dividing Polynomials
- Solving Polynomial Equations
- Graphing Polynomial Functions
- Rational Functions

Unit 4: Exponential and Logarithmic Functions

- Exponents and Radicals
- Exponential Functions
- Geometric Sequences
- Introduction to Logarithms
- Graphs of Logarithmic Functions
- Applications of Logarithms

Unit 5: Conic Sections

- Introduction to Conic Sections
- Ellipse
- Hyperbolas
- Parabolas
- Systems of Conic Sections

Unit 6: Semester Review

- Review
- Exam

Semester 2

Unit 1: Right Triangles

- Right Triangles
- Angles and Radians

- Trigonometric Ratios and the Unit Circle

Unit 2: Trigonometric Functions

- Graphs of Sine and Cosine
- Graphs of Other Functions
- Simple Transformations of Sinusoids
- General Transformations of Periodic Graphs

Unit 3: Working with Trigonometric Functions

- Inverse Trigonometric Functions
- Solving Trigonometric Equations
- Modeling Simple harmonic Motion

Unit 4: Trigonometric Identities

- Identities and Proof
- Trigonometric Identities
- Applications of Identities

Unit 5: Applications of Trigonometry

- Law of Cosines
- Law of Sines
- Vectors

Unit 6: Complex Numbers

- Polar Coordinates
- Graphs of Polar Functions
- Polar Form of Complex Numbers
- Arithmetic of Complex Numbers
- Powers and Roots of Complex Numbers

Unit 6: Semester Review

- Review
- Exam