



## COURSE SYLLABUS

Course: Precalculus with Trigonometry

Number: MAT 1140

Credit-Hours: 4 credits

Course Description: Properties of real numbers, order and absolute value, complex numbers, scientific notation, factoring polynomials, linear and quadratic equations, systems of equations, linear inequalities, and graphing, exponential, logarithmic, and trigonometric functions, including identities, inverse trigonometric functions, and right triangle trigonometry.

Prerequisites: 3 years high school mathematics or departmental consent.

Detailed Syllabus:

### 0. Getting Started

1. Email and Chat
2. Learning About the Course
3. Required Hardware
4. Software Fundamentals

### 1. The Big Picture

1. Solving (easy) equations in 1 variable.
2. What if you can't solve for  $x$ ?
3. Finding solutions numerically
4. Finding solutions graphically
5. Solving equations of more than 1 variable

### 2. Functions

1. Function notation.
2. Data sets
3. Graphing functions
4. Data sets and smooth curves
5. Domain and Range
6. Algebraic combinations of functions

### 3. Linear Functions

1. Algebraic definition
2. Slope
3. Graphing linear functions by hand
4. Properties of linear functions
5. Linear data sets

4. Quadratic Functions
  1. Algebraic definition
  2. Graphing and Properties of Quadratic Functions
  3. Solving quadratic equations algebraically: Factoring
  4. Solving quadratic equations algebraically: Quadratic formula
  5. Solving quadratic equations numerically and graphically
  6. Complex Numbers
  7. Quadratic data sets
  
5. Power and Polynomial Functions
  1. Algebraic definition
  2. Graphing and Properties of Polynomial Functions
  3. Solving polynomial equations algebraically: factoring
  4. Solving polynomial equations numerically and graphically
  5. Fundamental Theorem of Algebra
  6. Radicals and fractional exponents
  
6. Rational Polynomial Functions
  1. Algebraic definition
  2. Graphing and Properties of Rational Polynomial Functions
  3. Solving rational polynomial equations algebraically: factoring
  4. Solving rational polynomial equations numerically and graphically
  
7. Inequalities, Systems of Equations
  1. Inequalities of 1 variable
  2. Inequalities of 2 variables
  3. System of Equations in 2 variables
  4. Introduction to Matrices
  5. Inverses
  6. Determinants
  7. Cramer's Rule
  
8. Exponential Functions
  1. Algebraic definition
  2. Graphing and Properties of Exponential Functions
  3. Solving exponential equations numerically and graphically
  4. Exponential Growth and Applications
  5. Data sets and exponential functions.
  
9. Logarithmic Functions
  1. Inverse Functions
  2. Algebraic Definition
  3. Graphing and Properties of Logarithmic Functions
  4. Solving exponential and logarithmic equations algebraically
  5. Solving logarithmic equations numerically and graphically
  6. Logarithmic Growth and Applications
  7. Data sets and logarithmic functions.

## 10. Trigonometry

1. Geometry of Right Triangles
2. The Unit Circle
3. The (Circular) Trigonometric Functions
4. Graphing and properties of trigonometric functions: frequency, amplitude, shifting
5. Radians and degrees
6. Trigonometric identities
7. Inverse Trigonometric functions
8. Solving Trigonometric equations algebraically
9. Solving Trigonometric equations graphically and numerically
10. Applications of trigonometry
11. Laws of sines and cosines
12. DeMoivre's Theorem

## 11. Analytic Geometry

1. The Cone
2. Parabolae, Hyperbolae, Ellipsi
3. Polar Coordinates
4. Parametric Equations and Graphs

## 12. Sequences and Series

1. Sequences
2. Summation
3. Arithmetic and Geometric Sequences and Series