Prepared by the Department of Mathematics
Date of Departmental Approval: November 6, 2017
Date approved by Curriculum and Programs: January 18, 2018   Effective: Fall 2018

1. **Course Number: MAT195**
   Course Title: Precalculus with Trigonometry

2. **Description:** Targeting students in Mathematics, Engineering, and Physical Sciences, this course provides the foundation necessary for a rigorous study of calculus. It covers non-linear inequalities, functions, and graphs. The primary focus is on polynomial, rational, exponential, logarithmic, and trigonometric functions. Applications are also discussed extensively. Additional topics may include analytic geometry with an emphasis on the conic sections, Gibbs notation vector algebra, polar coordinates, sequences, series, and mathematical induction. (5 contact hours)

3. **Student Learning Outcomes (instructional objectives, intellectual skills):**
   Upon successful completion of this course, students are able to do the following.
   - Solve quadratic, absolute value, rational equations and inequalities.
   - Solve exponential and logarithmic equations.
   - Perform basic operations on functions including composition.
   - Demonstrate all basic techniques in graphing functions.
   - Graph polynomial, rational, radical, absolute value, exponential, and logarithmic functions.
   - Graph and manipulate inverse functions.
   - Compute the average rate of change.
   - Solve application problems that involve defining functions and finding maximum and minimum.
   - Solve a non-linear system of equations.
   - Define trigonometric functions by a right triangle and by the unit circle.
   - Prove trigonometric identities.
   - Graph trigonometric functions and their inverses.
   - Apply trigonometric identities to solve equations.
   - Use the laws of sine and cosine to solve geometric problems.
   - Utilize vectors to describe simple problems in Physics.
   - Recognize conic sections and graph their equations.
   - Graph of a polar equation.
   - Model with exponential, logarithmic, and trigonometric functions.

4. **Credits(s):** 4 credits

5. **Satisfies General Education Requirement:** No

6. **Prerequisite(s):** A grade of C- or higher in MAT175 (College Algebra) or satisfactory basic skills assessment score

7. **Semester(s) Offered:** Fall, Spring, Summer

8. **Suggested General Guidelines of Evaluation:** Comprehensive final exam, tests, quizzes, homework, and projects.

9. **General Topical Outline (Optional):**

   I.   Review on College Algebra
   A.   Solving absolute value equations and inequalities
   B.   Solving quadratic equations and inequalities
   C.   Function and its graph
   D.   Techniques in graphing
   E.   Algebra of functions and composition
   F.   Linear and quadratic modeling

G. Maximum and minimum problem
H. Graphs of polynomial and rational functions

II. Exponential and Logarithmic Functions
A. Exponential functions and their graphs
B. Inverse functions and logarithmic functions
C. Properties of logarithms
D. Applications

III. Trigonometric Functions of Angles
A. Geometry and trigonometric functions of acute angles
B. Algebra & trigonometric Functions
C. Right-triangle applications
D. Trigonometric functions of angles
E. Trigonometric identities
F. Radian measure

IV. Trigonometric Functions of Real Numbers
A. Graphs of the sine & cosine
B. Analytical trigonometry
C. Trigonometric equations
D. The inverse trigonometric functions

V. Additional Topics in Trigonometry
A. The laws of sines & cosines
B. Vectors in the plane – geometric and algebraic approach
C. Introduction to polar coordinates
D. Curves in polar coordinates

VI. Conic Sections
A. Parabolas, ellipses, and hyperbolas
B. Conics in polar coordinates
C. Rotation of axes

VII. Additional Topics
B. Mathematical induction
C. Binomial theorem
D. Sequences
E. Gaussian elimination
F. Determinants and Cramer's rule
G. Nonlinear systems