Course Abbreviation & Number: MATH 1113H

Course Title: Precalculus (Honors)

Credit Hours: 3

Prerequisites:

Math 1111 with a grade of A or B or appropriate placement and Permission of the Honors Coordinator

Co-requisites:

None

Course Description:

This course focuses on the study of trigonometry, including circular functions, triangle trigonometry, trigonometric equations and identities, inverse trigonometric functions, and vectors. Selected topics from algebra are reviewed and extended. This course is designed to prepare students for calculus, algebra-based physics, and related technical subjects. This course is Math 1113 for Honors students.

Expected Educational Results:

As a result of completing this course, the student will be able to

1. Graph rational functions with an emphasis on understanding and describing the asymptotic behavior near vertical, horizontal, and slant asymptotes.
2. Apply the right triangle definitions of the trigonometric functions.
3. Convert between degrees and radians and solve problems involving lengths of circular arcs.
4. Apply the unit circle definitions of the six trigonometric functions.
5. Graph the six basic trigonometric functions and graph transformations of sine and cosine.
7. Apply the Pythagorean, addition and subtraction, and double-angle identities.
8. Verify trigonometric identities.
9. Use power-reducing identities and derive the double-angle identities and power-reducing identities.
10. Apply the definitions of inverse sine, inverse cosine, and inverse tangent and graph these functions.
11. Solve equations involving trigonometric functions.
12. Represent vectors both algebraically and geometrically, perform scalar multiplication, find the sum of two vectors, find the magnitude of a vector, and decompose a vector into horizontal and vertical components.
13. Graph conic sections.
15. Write the terms in a sequence given a formula for the sequence, expand and evaluate a finite series expressed in summation notation, and express a given finite series using summation notation.

**General Educational Outcomes:**

This course supports the general education outcome that “Students demonstrate the ability to interpret and analyze quantitative information; apply mathematical principles and techniques; and to use mathematical models to solve applied problems.”

**Course Content:**

(Order of Topics May Vary)

1. Trigonometric Functions
   a. Radian and Degree Measure
   b. Right Triangle Trigonometry with Applications
   c. The Unit Circle and Definitions of Trigonometric Functions
   d. Graphs of Sine and Cosine Functions
      i. Basic Graphs
      ii. Amplitude, Period, Phase Shifts, and Vertical Shifts
   e. Graphs of Other Trigonometric Function
   f. Inverse Sine, Inverse Cosine, and Inverse Tangent
      i. Definitions and Applications
      ii. Graphs
2. Analytic Trigonometry
   a. Fundamental Identities
   b. Verifying Trigonometric Identities
   c. Addition and Subtraction Formulas
   d. Double-Angle and Power-Reducing Formulas
   e. Solving Trigonometric Equations
3. Additional Topics in Trigonometry
   a. Law of Sines with Applications
   b. Law of Cosines with Applications
   c. Vectors
4. Additional Topics in Algebra
   a. Graphing Rational Functions
   b. Non-linear Systems of Equations
   c. Graphing Conic Sections
   d. Sequences and Summation Notation

### Assessment of Outcome Objectives

#### Course Grade:

The course grade will be determined by the individual instructor using a variety of methods such as exams, quizzes, projects, or homework. The method for determining the course grade should be clearly explained on the course syllabus and is subject to department chair approval.

A comprehensive final examination is required which must count at least one-fifth and no more than one-third of the course grade.

In the honors course, at least 15% of the course grade will be based on projects or computer activities.

Option 1: Include two or three projects in the course. The projects should involve a writing component and/or a class presentation. Individual instructors will be responsible for determining the topics for the projects and for developing the projects. Examples of possible project topics include:
- Trigonometric functions as models of periodic phenomena or harmonic motion.
- Applications of triangle trigonometry.
- Applications of conic sections.
- Arithmetic and geometric series and their applications.
- Mathematical induction and verification of summation formulas.
- Linear, quadratic, exponential, and/or sinusoidal regression.
- Average and instantaneous rates of change.

Option 2: Integrate a computer algebra system into the course. This integration could be done with either two or three substantial out-of-class projects or with a series of in-class activities for classes with access to a computer classroom.

#### Course Assessment:

- This course will be regularly assessed in accordance with GPC
policies. The course will be assessed at least once every three years.

- The assessment instrument will be a ten to twelve question multiple-choice assessment developed by the Math 1113 course committee.
- The assessment will be administered in all sections as part of the final exam.
- The criteria for success on each assessment item would be for 70% of the students to correctly answer the item.

**Use of Assessment Findings:**

The Math 1113 committee will analyze the results of the assessment and determine implications for curriculum changes. The committee will prepare a report that summarizes its findings for the Academic Group.

**Last Revised:**

March, 2014