Math 104
PreCalculus

Advising

This course is a prerequisite for the Calculus sequence. This course is not meant to be an algebra review; mastery of Algebra II is expected. It is an intensive mathematics course, which is appropriate for students looking to acquire significant algebraic, graphical, and numerical skills.

Precalculus is a mathematics core course. However, for students who are just looking to satisfy their mathematics core requirement and have no specific requirement from their major, **Math 110 and/or Math111 may be more appropriate courses**.

This is not a high school course; it is a course which focuses on the study of functions and is an essential preparation for Calculus.

Catalog Description

"Topics covered include an in-depth investigation of functions; graphing; exponential and logarithmic functions; and trigonometry. Prerequisite: High School Algebra II or Math 0103.

Course Objectives

The objective of this course is to give the students the fundamentals they will need in the calculus courses. In particular, students will be introduced to topics including functions (symbolically, numerically, and graphically), trigonometry, and exponential and logarithmic functions. At the same time, students' ability to think independently while problem solving should be developed. These ideas may or may not be supplemented through the use of graphing calculators (use of a graphing calculator is recommended).

Required Topics

As this is a course on functions, students start by learning the concepts of relation, function, and 1-1 function, including domain and range, behavior of the function (increasing/decreasing), continuity, extrema, y- and x-intercepts, asymptotes, even/odd, symmetries.

Students will investigate the definition, graphs, and properties of the following functions:

- Linear functions, slope and y-intercept, solution of linear equations
- Quadratic functions and other even-powered functions, quadratic formula, vertex, solution of quadratic equations
- Cubic functions and other odd-powered functions
- Polynomials and rational functions
- Absolute value function
- Step functions
- Square root and other roots
- 1/x

- The three basic trigonometric functions sine, cosine, tangent, degrees and radians, definition of a periodic function
- Exponential function and logarithms, change of base formula
- Inverse functions
- Composition of functions
- (optional) Polar coordinates, complex numbers

Applications are covered as appropriate.

Students gain an understanding of the definition and practical meaning of the slope and rate of change.

Transformation and translation of graphs are investigated.

Core Status

Math 104 is a core mathematics course satisfying the "Traditional Mathematics" sub-area. It satisfies these areas in the following ways (from the 1997 core inclusion form):

Course Objectives

1. Recognize, understand, utilize, integrate and communicate mathematical concepts, mathematical methods and logical reasoning.

The in-depth study of the fundamental mathematical concept of function provides the student with an opportunity to recognize, understand, utilize, integrate and communicate mathematical concepts, methods and reasoning. Students will develop both analytical and graphical methodology, and will see how these concepts and methods form a mathematical foundation for the sciences, and for the study of calculus.

2. Apply mathematical concepts, mathematical methods, and mathematical reasoning within an analytic framework.

Students will apply the following mathematical concepts, methods, and reasoning: functions, graphs; constructing and solving linear, quadratic, higher-order polynomial, exponential, and trigonometric equations; finding equivalent algebraic expressions involving rational exponents; applying exponential, logarithmic, and trigonometric functions; and applications which involve solving right triangle and general triangle problems using trigonometry.

3. Conceptualize and utilize algorithms and formal mathematical structures.

Algorithms used in the course include simplifying and reducing algebraic expressions, solving linear equations, solving quadratic equations by factoring and by the quadratic formula, solving higher-order polynomial equations, converting between radical and rational exponent notation, solving exponential equations, and solving trigonometric equations.

Course Requirements

1. Introduce traditional mathematical concepts, constructs, systems, algorithms, and methods of inquiry and

analysis.

This course uses an in-depth study of functions and graphing to illustrate traditional mathematical concepts, constructs, systems, algorithms, and methods of inquiry and analysis. This study extends to exponential, logarithmic, and trigonometric functions.

2. Provide an environment where students can construct, investigate, learn, and/or apply those attributes described in Course Requirement 1.

Classroom lecture and discussion, group work, projects and presentations are combined to create a learning environment.