CUMBERLAND COUNTY COLLEGE

Course: MA 121 Precalculus Mathematics

Credits: 4

Prerequisites
MA094, high school coursework in trigonometry, and the permission of the instructor or placement by Accuplacer score.

Description
Topics include polynomial, rational, exponential, logarithmic and trigonometric functions, the complex number system, and conic sections. Precalculus is designed to prepare students for Calculus I. MA 121 is equivalent to MA 110 and MA 120.

Learning Outcomes
At the completion of this course, students should be able to:

• Create and analyze graphs of functions
• Identify and graph transformations, combinations, and inverses of polynomial functions
• Analyze and solve rational functions by applying knowledge of synthetic division, complex numbers, and asymptotic graphs
• Recognize, graph, and evaluate exponential and logarithmic functions
• Apply properties of logarithms to evaluate, rewrite, expand, or condense logarithmic expressions
• Solve exponential and logarithmic equations and apply exponential growth models, exponential decay models, logistic growth models, and logarithmic to solve real-life problems
• Solve systems of equations by substitution, by elimination, and by graphing
• Convert and apply radian and degree measure
• Apply angles and trigonometric functions to model and solve real-life problems
• Evaluate trigonometric functions using a unit circle, acute angles, or calculator
• Interpret and evaluate trigonometric functions using fundamental trigonometric identities, reference angles
• Create and interpret graphs of the trigonometric functions, inverse trigonometric functions, composition of trigonometric functions, and inverse functions
• Utilize fundamental trigonometric identities to evaluate trigonometric functions, simplify trigonometric expressions, and rewrite trigonometric expressions
• Apply trigonometric identities to verify other trigonometric identities, solve trigonometric equations, and construct further trigonometric identities
• Apply the law of sines and the law of cosines to solve oblique triangles and model real-life problems
• Recognize a conic as the intersection of a plane and double-napped cone, convert information, or a general form of equation of a conic, to its standard form.
• Evaluate, analyze, graph a set of parametric equations for a given value of the parameter and convert a set of parametric equations as a single rectangular equation
• Plot points on the polar coordinate system, and convert points and equations from rectangular to polar form.

**Related General Education Outcomes**
• Students will translate quantifiable problems into mathematical terms and solve these problems using mathematical or statistical operations.
• Students will construct graphs and charts, interpret them, and draw appropriate conclusions.

**Topical Outline**
Graphs and Functions
  • Graphs of equations
  • Lines
  • Functions
  • Library of functions
  • Transformation of functions
  • Combining functions; composite functions
  • Inverse functions
Systems of Equations
  • Systems of equations in two variables
  • Systems of equations in Three variables
Polynomial and Rational Functions
  • Quadratic functions
  • Polynomial functions
  • Dividing polynomials and the Rational Zeros Test
  • Zeros of a polynomial function
  • Rational functions
Exponential and Logarithmic Functions
  • Exponential functions
  • Logarithmic functions
  • Exponential and logarithmic equations and inequalities
Trigonometric Functions
  • Angles and their measure
  • The Unit Circle: trigonometric functions of real numbers
  • Trigonometric functions of angles
  • Graphs of Sine and Cosine functions
  • Graphs of other trigonometric functions
  • Inverse trigonometric functions
Applications of trigonometric functions (triangle trigonometry)
  • Right–triangle trigonometry
  • The Law of Sines
  • The Law of Cosines
Analytic Trigonometry
Trigonometric identities and equations
Trigonometric equations
Sum and Difference formulas
Double-Angle and Half-Angle formulas
Product-to-Sum and Sum-to-Product formulas
Analytic Geometry (including Conics and Polar and Parametric Equations)
  Conic Sections: overview
  The Parabola
  The Ellipse
  The Hyperbola
  Parametric Equations
  Polar Coordinates

**Required Texts and Other Materials**

**Student Assessment**
Assessment may be accomplished through projects, portfolios, online assignments, exams, presentations and/or papers.

**Academic Integrity**
Plagiarism is cheating. Plagiarism is presenting in written work, in public speaking, and in oral reports the ideas or exact words of someone else without proper documentation. Whether the act of plagiarism is deliberate or accidental [ignorance of the proper rules for handling material is no excuse], plagiarism is, indeed, a “criminal” offense. As such, a plagiarized paper or report automatically receives a grade of **ZERO** and the student may receive a grade of **F** for the semester at the discretion of the instructor.

**Available Resources**
If you are having difficulty with work in this class, tutoring is available through the Success Center. If you think that you might have a learning disability, contact Project Assist at 856.691.8600, x1282 for information on assistance that can be provided to eligible students.

*(List availability of open labs and/or writing center)*

**Before Withdrawing From This Course**
If a student experiences adverse circumstances while enrolled in this course and considers withdrawing, s/he should see an advisor (division or advisement center) BEFORE withdrawing from the class. A withdrawal may cause harmful repercussions to completion rate standards and overall GPA which can limit or eliminate future financial aid in addition to causing academic suspension.