

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

Precalculus, A Unit Circle Approach by Ratti-McWaters, 2nd edition: Pearson. 2014

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.