

HOWARD COMMUNITY COLLEGE - COURSE OUTLINE

MATH 135 Precalculus

5 Semester Hours

Description

In this course, students will develop skills in the analysis of functions and solving of equations and inequalities. The function concept will be central, with the focus on preparing students for calculus. Polynomial, rational, exponential, logarithmic and trigonometric functions will be studied in detail. Additional topics include complex numbers, conic sections, sequences and series, and parametric equations. Modeling using data analysis will be an integral part of this course. A graphical approach will be utilized throughout, with an emphasis on solving application problems. A graphing calculator is required and the computer algebra system DERIVE will also be used. Not open to students who have completed MATH 131 or MATH 133. MATH 135 is equivalent to MATH 131 and 133.

Prerequisite: Appropriate score on math placement test or equivalent.

Overall Course Objectives

Upon completion of this course, the student will be able to:

1. Use the basic properties and rules of the real number system to solve problems involving radical and absolute value expressions.
2. Evaluate and graph functions, some of which are altered by shifts, reflections, and/or transformations.
3. Perform the basic operations on or find the composite of two or more functions.
4. Find and graph the inverse of a function.
5. Solve absolute value and non-linear inequalities.
6. Apply classic theorems to find the zeros of polynomial equations and graph its corresponding function.
7. Operate with complex numbers in standard (rectangular) form.
8. Graph rational functions.
9. Use exponents and logarithms to solve equations and application p problems.
10. Define and graph the trigonometric functions and their inverses.
11. Prove or disprove trigonometric identities and solve trigonometric equations.
12. Apply area, sum and difference, double angle, half-angle trigonometric formulas and the standard trigonometric identities.
13. Use the Law of Sines and Cosines.
14. Operate with complex numbers in trigonometric form.
15. Apply DeMoivre's Theorem
16. Find polynomial, exponential and trigonometric models that best fit a set of data.
17. Apply and graph parametric equations.
18. Determine and apply arithmetic and geometric sequences
19. Manipulate series and summation notation
17. Solve application problems.
18. Use a scientific programmable graphing calculator in solving problems.

Major Topics

- I. Graphs, Functions, and Models
 - A. Functions, and Graphs
 - B. Slope (Rate of Change)
 - C. Curve Fitting, and Linear Regression
 - D. Analysis of Functions
 - E. Symmetry and Transformations
 - F. Circles

- II. Functions and Equations: Zeros and Solutions
 - A. The Complex Numbers
 - B. Quadratic Like Functions
 - C. Analyzing Graphs of Quadratic Functions
 - D. Quadratic Regression
 - E. Radical and Absolute Value Equations
 - F. Solving Inequalities

- III. Polynomial and Rational Functions
 - A. Polynomial Functions and Modeling
 - B. Polynomial Division; The Remainder and Factor Theorems
 - C. Theorems about Zeros of Polynomial Functions
 - D. Rational Functions
 - E. Polynomial and Rational Inequalities

- IV. Exponential and Logarithmic Functions
 - A. Composite and Inverse Functions
 - B. Exponential Functions and Graphs
 - C. Logarithmic Functions and Graphs
 - D. Properties of Logarithmic Functions
 - E. Solving Exponential and Logarithmic Equations
 - F. Applications and Models: Growth and Decay

- V. Trigonometry
 - A. Right Triangle Trigonometry
 - B. Trigonometric Functions, Their Inverses, and Graphs
 - C. Solving Equations and Verifying Identities
 - D. Sum and Difference, Double Angle, and Half-Angle Formulas
 - E. Law of Sines and Cosines
 - G. Trigonometric Form of a Complex Number
 - H. DeMoivre's Theorem and Nth Roots

- VI. Analytic Geometry
 - A. Properties of Conic Sections and Graph
 - B. Standard Equation of a Conic Curve
 - C. Parametric Equations

- VII. Sequences and Series
 - A. Basic and Recursive Definitions
 - B. Arithmetic and Geometric Sequences
 - C. Finite and Infinite Series

Course Requirements

Required Text: Contemporary Precalculus: a Graphing Approach by Thomas Hungerford

Required Calculator: Graphing Calculator (TI-83, TI-83+ or TI-84 recommended)

A calculator with a computer algebra system, like the TI-86, will not be allowed on tests.

Required Computer Usage: Derive (a computer algebra system), available in class and in the computer labs.

Grading/Exams: Grading procedures will be determined by the individual faculty member but will be based on several unit exams and a comprehensive final exam.

Other Course Information

MATH 135 is a prerequisite course for the main calculus sequence, MATH 140/150 , intended primarily for mathematics, science and engineering majors. If you are a business, social science or humanities major, your interests may be better served by taking MATH 145 (Business Calculus) or MATH 138 (Statistics). Contact the counseling center and your transfer institution for more specific information.

This course is a Math core course and an Arts and Science elective.

Transferability: MATH 135 generally transfers to four-year institutions. Contact the counseling center for specific information.