Cape Cod Community College

Course Syllabus

Prepared by the Department of Mathematics
Date of Departmental Approval: January 23, 2017
Date approved by Curriculum and Programs: February 22, 2017 **Effective: Fall 2017**

1. **Course Number: MAT175**
   Course Title: College Algebra

2. **Description:** This is an entry-level mathematics course for students interested in a STEM (Science, Technology, Engineering, Math) track. Topics include: domain and range, piecewise functions, complex numbers, quadratic inequalities, graphs of polynomial and rational functions, fundamental theorem of algebra, transformations of graphs, inverse functions, solving exponential and logarithmic equations, Gaussian elimination, and translations of conics. Critical thinking and problem solving skills are emphasized throughout the course. This course prepares students for Precalculus with Trigonometry or Applied Calculus. (5 contact hours)

3. **Student Learning Outcomes (instructional objectives: intellectual skills):**
   Upon successful completion of this course students are able to do the followings.
   - Solve linear, absolute value, quadratic, rational, radical, exponential, logarithmic equations, as well as systems of equations.
   - Expand and combine logarithmic expressions using properties of logarithms.
   - Solve absolute value and quadratic inequalities and express the solution set in interval notation.
   - Identify one-to-one functions and construct their inverses.
   - Graph polynomial, rational, radical, exponential, and logarithmic functions.
   - Graph a circle, parabola, ellipse, or hyperbola given its equation.
   - Translate and reflect a graph.
   - State the domain, the range, and increasing/decreasing intervals of a given function.
   - Solve polynomial equations (including using synthetic division) and locate all zeros.
   - Construct a function that models an application problem and analyze the graph of such function to obtain a solution.
   - Examine the characteristics of mathematical models using a graphing utility and interpret the significance in real-life situations.

4. **Credits(s):** 4 credits (5 contact hours)

5. **Satisfies General Education Requirement:** Mathematics/Quantitative Reasoning

6. **Prerequisite:** MAT045 (Intermediate Algebra for STEM) or satisfactory basic skills assessment score

7. **Semesters Offered:** Fall, Spring, Summer

8. **Suggested General Guidelines for Evaluation:** Comprehensive final examination, tests, quizzes, homework, and project.

9. **General Topical Outline**

I. Review on Functions
   A. Function notations
   B. Representations of a function
   C. Domain and range
   D. Linear functions and their graphs
   E. Increasing, decreasing, and piecewise functions
   F. Algebra of functions and composition
   G. Modeling with functions

II. Quadratic Functions and their Applications
   A. Parabolas, vertex, and quadratic models
   B. Solving quadratic equations and its applications
   C. Complex numbers and the discriminant
   D. Solving quadratic inequalities

E. Transformations of graphs: shifts, stretching/shrinking, and reflections

III. Polynomials, Rational Functions, and their Graphs
- A. Graph of a polynomial function
- B. Odd and even functions
- C. Graphical characteristics of a cubic, quartic, and quintic polynomial
- D. Division algorithm and the reminder theorem
- E. Zeros and factoring polynomials
- F. The fundamental theorem of algebra
- G. Graphing a rational function

IV. Exponential and Logarithmic Functions
- A. Rational exponents and radicals
- B. Exponential functions and their graphs
- C. Compound interest
- D. Combining functions
- E. Inverse functions and their graphs
- F. One-to-one functions
- G. Logarithmic functions
- H. Bases and properties of logarithms
- I. Solving exponential and logarithmic equations

V. Systems of Linear equations in Three Variables
- A. Matrices
- B. Gaussian elimination

VI. Conic Sections
- A. Focus and directrix of a parabola
- B. Ellipses and hyperbolas
- C. Translations of conics
- D. Parametric equations