



Middlesex Community College
COURSE OUTLINE

MAT	173	College Algebra with Technology	4
Dept. Abbr.	Course No.	Course Title	Credits

Course Description

This course continues the algebra sequence. Topics include operations with complex numbers; functions; numeric, algebraic, and graphic techniques as applied to the following functions: polynomial, rational, radical, piecewise, and absolute value; modeling and applications using the above functions; absolute value, quadratic, and rational inequalities; exponential expressions and equations; logarithmic expressions and equations. There will be an emphasis on modeling and applications for all topics. Optional: conic sections, systems of non-linear equations. A graphing calculator is required for this course.

Prerequisite: Eligible for ENG*101 and MAT*137 (or higher) with a grade of “C” or better OR eligible for ENG*101 and math placement.

General Objectives of the Course

Students in this course will:

- Define and represent different functions numerically, verbally, symbolically and graphically
- Understand and recognize the characteristics of key functions and their interrelations by examining patterns among the functions and their corresponding graphs by way of inductive reasoning
- Identify, interpret and model various types of quantitative relationships within applications
- Use technology to explore and draw reasonable conclusions from graph, tables and equations
- Provide clear, logical and organized explanations through verbal and written responses

General Education Competencies

Students in this course will:

- Quantitative Reasoning (D)
 - (1) Represent mathematical and quantitative information symbolically, graphically, numerically, and verbally.
 - (2) Apply quantitative methods to investigate routine and novel problems. This includes calculations, procedures, mathematical and /or statistical modeling, prediction, and evaluation.
 - (3) Interpret mathematical and quantitative information and draw logical inferences from Representations such as formulas, equations, graphs, tables and schematics
 - (4) Evaluate the results obtained from quantitative methods for accuracy and/or reasonableness.

- Critical Analysis and Logical Thinking (E)
 - (2) Formulating arguments: Formulates good arguments, including a significant focus on inductive reasoning.
 - (3) Analysis: Break subject matter into components and identify their interactions to ascertain the defining features of the work and their contributions to the whole.

- Written Communication (E)
 - (3) Craft Logical Arguments
 - Generate a controlling idea or thesis
 - Provide clear and logical evidence, support, or illustration for their assertions
 - Choose appropriate and effective organizing methods, employing effective transitions and signposts.

Unit No	Instructional Unit	Specific Objectives of Instructional Unit
1	Complex Numbers	<ul style="list-style-type: none"> • (The specific objectives reflect the behavioral outcomes, which include what the student will be able to do at the completion of the unit. Evaluation is then to be based on the student's accomplishment of these objectives. Assume that each statement is prefixed with "The student will be able to".) • Demonstrate understanding of the concept of complex numbers. • Perform operations with complex numbers.
2	Functions and Inequalities	<ul style="list-style-type: none"> • Define function, domain, range. • Evaluate and graph piecewise defined functions. • Combine functions by composition. • Define inverse functions and find the inverse of elementary functions. • Produce graphs of power, quadratic, and absolute value functions both by hand and with technology. • Produce graphs involving shifting, reflecting, stretching, and shrinking of known graphs. • Solve absolute value inequalities. • Solve quadratic and rational inequalities. • Identify intervals on which a function's graph increases and decreases.
3	Additional Function Concepts	<ul style="list-style-type: none"> • Graph polynomial, rational, radical, and piecewise-defined functions both by hand and with technology. • Polynomial functions: find real and complex zeros, apply the leading coefficient test, remainder theorem, factor theorem, and rational root test. • Rational functions and their graphs: determine the domain and range; find zeros; find equations of vertical, horizontal, and oblique asymptotes. • Radical functions and their graphs: determine domain and range; find zeros. • Apply polynomial, rational, radical, and piecewise-defined functions as mathematical models.
4	Exponential expressions and equations	<ul style="list-style-type: none"> • Simplify exponential expressions. • Solve basic exponential equations in one variable. • Demonstrate understanding of the number e. • Graph exponential equations in two variables.
5	Logarithmic expressions and equations	<ul style="list-style-type: none"> • Demonstrate understanding of the concept of logarithm. • Rewrite logarithmic expressions in exponential form, and vice versa. • Explain the difference between common and natural logarithms. • Apply the properties of logarithms to simplify logarithmic expressions. • Solve basic logarithmic equations in one variable. • Graph logarithmic equations in two variables.

6	Conic Sections (Optional)	<ul style="list-style-type: none">• Demonstrate understanding of the concept of conic sections.• Define parabola, circle, ellipse, hyperbola.• Parabolas: Graph by hand and with technology; find and interpret the standard equation of a parabola; identify the vertex, focus, directrix, latus rectum (and find its length).• Ellipses: Graph by hand and with technology; find and interpret the standard equation of an ellipse; identify the center, foci, major and minor axes (and find their lengths), eccentricity.• Hyperbolas: Graph by hand and with technology; find and interpret the standard equation of a hyperbola; identify the vertices, center, foci, transverse and conjugate axes (and find their lengths), asymptotes.• Classify a conic from its general equation.• Solve systems of nonlinear equations (optional).
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