



**Middlesex Community College**  
**COURSE OUTLINE**

MAT	186	Precalculus	4
Dept. Abbr.	Course No.	Course Title	Credits

**Course Description**

Precalculus provides the mathematical preparation for the study of calculus. Topics include comparing and contrasting linear, quadratic, polynomial, rational, radical, exponential, and logarithmic function using numeric, algebraic and graphic techniques. Trigonometric functions will be studied extensively also using numeric, algebraic, and graphic techniques as well as right triangle trigonometry, identities, and trigonometric equations. There will be an emphasis on modeling and applications for all topics. A graphing calculator is required for this course.

**Prerequisite: Eligible for ENG\*101 and MAT\*173 (or higher) with a grade of “C” or better OR eligible for ENG\*101 and math placement**

*General Objectives of the Course*

- After successful completion of this course, the student will be able to:
- Compare and contrast the concepts of functions in their multiple representations (numerically, verbally, symbolically, and graphically) as applied to functions previously studied (linear, quadratic, polynomial, rational, exponential and logarithmic).
  - 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
  - Define and represent trigonometric functions numerically, verbally, symbolically and graphically
  - Simplify and verify trigonometric identities.
  - Solve trigonometric equations.
  - Use and apply trigonometric formulas and laws.
  - Use and apply sequences and series
  - Understand the relationship between polar and rectangular coordinate systems
  - Graph points and equations in a polar coordinate system
  - 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 Assume that each statement is prefixed with "The student will be able to".
1	Compare and Contrast the Concepts of Functions as Applied to Functions Previously Studied	<ul style="list-style-type: none"> <li>• Use and apply vocabulary associated with functions (linear, quadratic, polynomial, rational, exponential and logarithmic) and their graphs.</li> <li>• Find the domain and range of a given function.</li> <li>• Solve problems involving linear, quadratic, polynomial, rational, exponential, and logarithmic functions.</li> <li>• Describe and use linear, quadratic, polynomial, rational, exponential, and logarithmic models.</li> </ul>
2	Trigonometric Functions	<ul style="list-style-type: none"> <li>• Use and apply vocabulary associated with angle measure and trigonometric functions in both the unit circle and right triangle.</li> <li>• Find domain and range of trigonometric functions.</li> <li>• Graph trigonometric functions.</li> <li>• Solve problems using trigonometric functions and/or right triangle trigonometry.</li> <li>• Use and apply vocabulary associated with inverse trigonometric functions.</li> <li>• Find domain and range of inverse trigonometric functions.</li> <li>• Graph inverse trigonometric functions.</li> <li>• Solve problems involving inverse trigonometric functions.</li> <li>• Describe and use trigonometric models.</li> </ul>
3	Trigonometric Identities and Equations	<ul style="list-style-type: none"> <li>• Use fundamental trigonometric identities.</li> <li>• Verify trigonometric identities.</li> <li>• Solve trigonometric equations.</li> <li>• Use and apply sum/difference, multiple-angle, and product-sum formulas.</li> </ul>
4	Sequences and Series	<ul style="list-style-type: none"> <li>• Use and apply vocabulary associated sequences and series</li> <li>• Find particular terms of a sequence from the general term.</li> <li>• Find the common difference for an arithmetic sequence.</li> <li>• Find the common ratio of a geometric sequence.</li> <li>• Find the general term of a geometric sequence.</li> <li>• Find the sum of the first <math>n</math> terms of a geometric sequence.</li> <li>• Find the sum of an infinite geometric series.</li> <li>• Solve problems involving sequences and series.</li> </ul>

5	Polar Coordinates	<ul style="list-style-type: none"> <li>• Use and apply vocabulary associated with polar coordinates</li> <li>• Plot points in the polar coordinate system</li> <li>• Convert a point from polar to rectangular coordinates and vice versa.</li> <li>• Convert an equation from rectangular to polar coordinates and vice versa.</li> <li>• Use point plotting to graph polar equations.</li> <li>• Use symmetry to graph polar equations.</li> </ul>
6	Vectors (optional)	<ul style="list-style-type: none"> <li>• Use and apply vocabulary associated with vectors</li> <li>• Use magnitude and direction to show vectors are equal</li> <li>• Represent vectors in the rectangular coordinate system</li> <li>• Perform operations with vectors in terms of the unit vectors</li> <li>• Write a vector in terms of its magnitude and direction</li> <li>• Solve problems involving vectors.</li> </ul>