



**MERCER**  
COUNTY COMMUNITY COLLEGE

## COURSE OUTLINE

Course Number	Course Title	Credits
MAT 115	Algebra and Trigonometry I	3
Hours: Lecture/Lab/Other	Co- or Pre-requisite	Implementation Semester & Year
3 lecture hours	MAT 037 or MAT 042 or Multiple Measures Placement	Spring 2022

**Catalog description:** Primarily for students majoring in engineering technology or related programs. Topics include polynomial and rational expressions and equations, an introduction to trigonometric functions and applications of trigonometry, linear and quadratic equations and inequalities, systems of equations, operations on functions and function composition, and application problems.

**General Education Category:**  
Goal 2: Mathematics

**Course coordinator:**

Alison Becker-Moses, 609-570-3808, beckera@mccc.edu

**Required texts & Other materials:**

- Algebra and Trigonometry, Abramson, Jay, Openstax.org  
<https://openstax.org/details/books/algebra-and-trigonometry>  
Hardcover: ISBN-10: 1-938168-37-2  
ISBN-13: 978-1-938168-37-6  
Paperback: ISBN-13: 978-1-50669-800-7  
Digital: ISBN-10: 1-947172-10-7  
ISBN-13: 978-1-947172-10-4
- Calculator: A graphing calculator such as the TI-83 or TI-84 is required. No calculator with a symbolic manipulator is allowed.

**Course Student Learning Outcomes (SLO):**

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

1. solve and graph linear, quadratic, and absolute value equations. (ILG #2)
2. solve and graph linear and compound inequalities including absolute value inequalities. (ILG #2)
3. factor a second degree polynomial and some special higher degree polynomials. (ILG #2)
4. recognize and work with functions and function notation. (ILG #2)
5. perform operations and solve equations involving polynomial, radical and rational expressions. (ILG #2, 11)
6. solve a system of two linear equations. (ILG #2)
7. demonstrate knowledge of right triangle trigonometry and identify the graphs of trigonometric functions. (ILG #2, 11)

8. solve triangles other than right triangles. (ILG #2, 11)

**Course-specific Institutional Learning Goals (ILG):**

**Institutional Learning Goal 2. Mathematics.** Students will use appropriate mathematical and statistical concepts and operations to interpret data and to solve problems.

**Institutional Learning Goal 11. Critical Thinking:** Students will use critical thinking skills understand, analyze, or apply information or solve problems.

**Units of study in detail – Unit Student Learning Outcomes:**

**Unit I:** Polynomial, Rational, and Radical Expressions and Operations (Supports Course SLO #1, 4, 5)

**Learning Objectives**

***The student will be able to:***

- identify monomials and polynomials.
- add and subtract polynomials.
- multiply monomials and binomials and special products (squares of binomials, etc.)
- divide polynomials.
- factor the GCF from polynomials and expressions.
- factor polynomials by grouping.
- factor various trinomials.
- factor the difference of two squares, and the sum/difference of two cubes.
- express and solve quadratic equations using the zero product property.
- identify rational expressions and determine where they're undefined
- simplify rational expressions.
- multiply and divide rational expressions.
- find the LCD (least common denominator) for given rational expressions.
- add and subtract rational expressions.
- calculate square, cube, and  $n$ th root of a number.
- calculate and/or simplify expressions with radicals or rational exponents.
- add and subtract radical expressions.
- multiply and divide radical expressions.
- differentiate between relations and functions.
- use function notation to evaluate outputs for given inputs.
- identify the domain and range of a function.

**Unit II:** Equations and Inequalities (Supports Course SLO# 1, 2, 3, 5, 6)

**Learning Objectives**

***The student will be able to:***

- express and solve linear equations in one variable.
- determine if a given number is a solution to a given linear equation.
- express and solve linear inequalities in one variable.
- determine if a given number is a solution to a given linear inequality.
- graph solutions to linear inequalities on a real number line and express solutions in interval notation.
- solve and graph solutions to compound linear inequalities, as well as compound linear inequalities using “and” & “or” terminology.
- solve linear systems of equations having solutions.
- solve rational equations.

- solve quadratic equations by completing the square and/or the quadratic formula.

### **Unit III: Trigonometry (Supports Course SLO #4, 7)**

#### **Learning Objectives**

##### ***The student will be able to:***

- display proficiency in working with positive, negative, coterminal, straight, right, acute, obtuse, complementary, quadrantal, and supplementary angles.
- convert from radian measure to degree measure and vice-versa.
- use the formula  $\theta = \frac{s}{r}$  to find the radian measure for a central angle which subtends an arc  $s$  on a circle of radius  $r$ .
- find a positive and a negative coterminal angle for a given angle in degrees and radians.
- find linear speed and angular speed in applications.
- express the six circular or trigonometric functions in terms of the unit circle; in terms of  $a$ ,  $b$ , and  $r$ , or in terms of the sides of a right triangle.
- determine the signs of the trigonometric functions in any given quadrant.
- find the reference angle for a given angle.
- find the values of the six trigonometric functions for an angle  $\theta$  in standard position that has a terminal side passing through a given point  $(a,b)$  or when given the value of one of the trigonometric functions of the angle by hand or by calculator where appropriate.
- display proficiency in applying reciprocal and Pythagorean identities with trigonometric functions.
- solve for the missing sides and angles of a right triangle when given one other angle and a side or when given two sides.
- solve right triangles in contextual applications.
- sketch the graphs of equations of the form  $y = A \sin (Bx + C) + k$  or  $y = A \cos (Bx + C) + k$ , and determine the amplitude, period, phase shift and vertical shift, as well as the intercepts, domain and range.

### **Unit IV: Further Topics in Trigonometry (Supports Course SLO #8)**

#### **Learning Objectives**

##### ***The student will be able to:***

- state and apply the Laws of Sines and Cosines in standard skills and word problems.
- recognize and represent vectors and perform standard operations with vectors.

#### **Evaluation of student learning:**

Students should receive regular feedback on their work through tests, quizzes, and homework. All learning outcomes are assessed through tests. Questions will be selected to evenly assess all expected outcomes.

Grades will be assigned as detailed below:

Unit Tests (2)	30%
Quizzes and Homework	10%
Midterm Exam	25%
Final Exam	35%