**Course goals:** This course is designed to prepare students for MAC 1140 or MAC 1147. Content includes: reviewing real and complex numbers, solving various types of equations, graphing basic functions, and exploring exponential and logarithmic functions. The course goals are broken down into two categories:

I) **Core Modules:** The necessary concepts and skills required for success in MAC 1140 or MAC 1147. These Modules cover:
   1. Real and Complex Numbers
   2. Linear Functions
   3. Linear Inequalities
   4. Quadratic Functions
   5. Radical Functions
   6. Polynomial Functions
   7. Rational Functions
   8. Logarithmic and Exponential Functions

   This represents the necessary concepts and skills of College Algebra. After a review of the types of numbers we will encounter in the course, each Module explores a particular class of functions. Objectives for each Module are listed on the next page.

II) **Advanced Modules:** Preparation for how concepts in this course can be used in various academic paths. These Modules will prepare you for Calculus, Biological Sciences, or Computer Sciences.

   A) This set is designed to prepare you for the first concept you will encounter in Calculus: Limits.

   B) This set is designed to prepare you for modeling real-life phenomena using functions we explored in the Core Modules.

   C) This set explores the uses of functions in computer science and includes how to solve systems of equations using matrices.

   These sets build on the types of functions we explored in the Core Modules. They capture the three common reasons students take MAC 1105. Students will only work on one of the three tracks. Objectives for each Module are listed on the last page.
# Core Modules

**Module 1 - Real and Complex Numbers**
- Identify the subgroup of Real numbers a number belongs to.
- Identify the subgroup of Complex numbers a number belongs to.
- Apply the properties of Real numbers to simplify large expressions.
- Add/Subtract/Multiply/Divide Complex numbers.

**Module 2 - Linear Functions**
- Construct linear functions with a slope and point or with two points.
- Convert a linear function between slope-intercept form and Standard form.
- Convert between a linear equation and the graph of a linear equation.
- Solve linear equations.

**Module 3 - Linear Inequalities**
- Describe linear inequalities.
- Convert between linear inequalities, graphs of linear inequalities, and their interval notation.
- Solve linear inequalities.

**Module 4 - Quadratic Functions**
- Construct quadratic functions with a vertex and direction of function.
- Convert between quadratic functions and their graphs.
- Factor quadratic functions with leading coefficient greater than 1.
- Solve quadratic equations.

**Module 5 - Radical Functions**
- Identify the domain of a radical function.
- Convert between radical functions and their graphs.
- Solve radical equations that lead to linear or quadratic equations.

**Module 6 - Polynomial Functions**
- Identify the end behavior of a polynomial function (in factored form).
- Identify the zero behaviors of a polynomial function (in factored form).
- Convert between polynomial functions (in factored form) and their graphs.
- Construct lowest-degree polynomial functions given their zeros.

**Module 7 - Rational Functions**
- Identify the domain of a rational function.
- Convert between basic rational functions and their graphs.
- Solve rational equations that lead to linear or quadratic equations.

**Module 8 - Logarithmic and Exponential Functions**
- Describe the domain/range of logarithmic or exponential functions.
- Convert between logarithmic and exponential forms of an equation.
- Utilize the properties of logarithmic functions to simplify expressions.
- Solve exponential equations with same or different bases.
## Advanced Modules

### Calculus
This set is designed to prepare you for the first concept you will encounter in Calculus: Limits.

**A9 – Operations on Functions**
- Identify the domain after operating (+, −, x, ÷) on functions.
- Evaluate the composition of two functions.
- Determine whether a function is 1-1.
- Find the inverse of a function, if it exists.

**B9 – Modeling with Linear Equations**
- Identify when a real-world situation would require a linear function.
- Describe the domain on which the model is valid.
- Construct a model equation for the real-life situation.

**C9 – Operations on Functions**
- Identify the domain after operating (+, −, x, ÷) on functions.
- Evaluate the composition of two functions.
- Determine whether a function is 1-1.
- Find the inverse of a function, if it exists.

### Biological Sciences
This set is designed to prepare you for modeling real-life phenomena using functions we explored in the Core Modules.

**A10 – Synthetic Division**
- Divide two polynomials using synthetic division.
- Determine the possible rational roots of a polynomial.
- Use synthetic division to complete factor a polynomial.

**B10 – Modeling with Quadratic Equations**
- Identify when a real-world situation would require a quadratic function.
- Describe the domain on which the model is valid.
- Construct a model equation for the real-life situation.

**C10 – Introduction to Matrices**
- Convert a polynomial into an array.
- Convert a system of polynomials into a matrix.
- Identify the size of a matrix.

### Computer Sciences
This set explores the uses of functions in computer science and includes how to solve systems of equations using matrices.

**A11 – Introduction to Limits**
- Interpreting the notation for limits.
- Evaluate the left or right limit of a function.
- Evaluate the limit of a function.

**B11 – Modeling with Log or Exponential Equations**
- Identify when a real-world situation would require a log/exp function.
- Describe the domain on which the model is valid.
- Construct a model equation for the real-life situation.

**C11 – Operations with Matrices**
- Add or subtract two matrices.
- Multiply two matrices, if possible.
- Transpose a matrix.
- Describe why an operation on a matrix is valid.

### A12 – Graphing Rational Functions
- Use limits to determine the holes of a rational function.
- Use limits to determine the vertical asymptotes of a rational function.
- Use limits to describe the horizontal asymptotes of a rational function.
- Use limits to describe the oblique asymptotes of a rational function.

**B12 – Solving Real-World Modeling Word Problems**
- Determine the appropriate type of function to model the situation.
- Construct a model equation for the real-life situation.
- Solve the model equation.

**C12 – Solving Systems of Equations with Matrices**
- Identify the three basic transformations used to solve systems of equations.
- Describe why the three basic transformations are valid for solving equations.
- Solve systems of equations using matrix transformations.