



South Central College

# MATH 120 College Algebra

## Common Course Outline

### Course Information

**Description** College algebra studies functions and their applications. This course focuses on linear functions, quadratic functions, polynomial and rational functions, exponential and logarithmic functions, and related equations, inequalities, and graphs. Additional topics include inverse functions, systems of equations and inequalities, matrices, sequences and series, and the Binomial Theorem. Math 120 satisfies the MNTC Category 4 Mathematical/Logical Reasoning requirement.

**Total Credits** 4

**Total Hours** 64

### Types of Instruction

#### Instruction Type

Lecture

#### Credits/Hours

4/64

### Pre/Corequisites

At least one of the following conditions must be met for enrollment in Math 120:

Corequisite enrollment in Math 0098

Completion of Math 0085 with a grade of C or higher

Completion of Math 0095 with a grade of C or higher

Accuplacer score 56+ Arithmetic AND 76+ in Elementary Algebra AND 50+ in College Math

Next Gen Accuplacer score 250-300 AAF

ACT Math score 22-36

MCA score 1158-1164

### Institutional Core Competencies

Critical and Creative Thinking - Students will be able to demonstrate purposeful thinking with the goal of using a creative process for developing and building upon ideas and/or the goal of using a critical process for the analyzing and evaluating of ideas.

## Course Outcomes

- 1. Solve a variety of algebraic equations, including linear, absolute value, quadratic, polynomial, rational, radical, exponential, and logarithmic equations**

**Learning Objectives**  
Apply numerical methods to solve equations  
Apply graphical methods to solve equations  
Apply analytical methods to solve equations
- 2. Solve a variety of algebraic inequalities, including linear, absolute value, quadratic, polynomial, rational, radical, exponential, and logarithmic equations**

**Learning Objectives**  
Apply numerical methods to solve inequalities  
Apply graphical methods to solve inequalities  
Apply analytical methods to solve inequalities
- 3. Apply the mathematics of functions**

**Learning Objectives**  
Determine whether a relation is a function  
Evaluate a function  
Utilize function notation  
Find the domain and range of a function  
Compute the average rate of change of a function  
Compute the difference quotient of a function  
Find a sum, difference, product, and quotient of functions, and their domains  
Find a composite function and its domain
- 4. Graph a variety of algebraic functions, including linear, absolute value, quadratic, polynomial, rational, radical, exponential, and logarithmic functions**

**Learning Objectives**  
Apply transformations to graph a function  
Graph a piecewise defined function  
Graph a circle and find its center and radius
- 5. Analyze properties of various functions graphically and analytically**

**Learning Objectives**  
Determine the intercepts of a function  
Determine the domain and range of a graph.  
Determine the extrema of a graph  
Determine the intervals of increasing or decreasing from a graph  
Determine the end behavior of a function  
Determine any asymptotes of a function  
Identify symmetry of a function
- 6. Apply the mathematics of inverse functions**

**Learning Objectives**  
Define a one-to-one function  
Determine whether a function has an inverse  
Verify that two functions are inverses of one another  
Find the domain and range of an inverse function  
Compute the inverse of a function
- 7. Construct linear functions and models**

**Learning Objectives**  
Identify linear functions  
Determine the equation of a linear function  
Construct a linear model that represents a real world application or data set  
Interpret the slope and intercepts of a linear model

## **8. Construct quadratic functions and models**

### **Learning Objectives**

Identify quadratic functions

Determine the equation of a quadratic function in standard form and vertex form

Compute the vertex, axis of symmetry, intercepts, and maximum/minimum values of a quadratic function

Solve application problems involving quadratic models

Solve optimization problems involving quadratic models

## **9. Construct polynomial functions and models**

### **Learning Objectives**

Apply the Fundamental Theorem of Algebra

Find the zeros, real and complex, of a polynomial function

Define what it means for a function to be increasing or decreasing on an interval.

Factor a polynomial function over the complex numbers

Solve a polynomial equation with complex solutions

Solve application problems involving polynomial models

## **10. Construct rational functions and models**

### **Learning Objectives**

Identify rational functions

Determine the end behavior of a rational function

Determine any asymptotes of a rational function

Determine any holes of a rational function

Solve application problems involving polynomial models

## **11. Construct exponential functions and models**

### **Learning Objectives**

Identify exponential functions

Determine the equation of an exponential function

Distinguish between exponential growth and exponential decay

Solve application problems involving exponential models

## **12. Construct logarithmic functions and models**

### **Learning Objectives**

Identify logarithmic functions

Evaluate logarithmic expressions

Apply the properties of logarithms

Solve application problems involving logarithmic models

## **13. Solve systems of equations and inequalities**

### **Learning Objectives**

Solve a system of equations in two or three variables using the substitution or elimination methods.

Use technology to solve a system of equations

Solve a system of nonlinear equations graphically and analytically

Solve a system of inequalities graphically

## **14. Solve systems of equations using matrices**

### **Learning Objectives**

Translate between a system of equations and an augmented matrix

Apply elementary row operations to manipulate a matrix

Apply the technique of backwards substitution

Use technology to find solutions to an augmented matrix

## **15. Utilize sequences and series to solve problems**

### **Learning Objectives**

Compute the terms of a sequence

Distinguish between an arithmetic sequence and a geometric sequence  
Compute the sum of an arithmetic series  
Compute the sum of a geometric series  
Utilize sigma notation to work with series  
Solve application problems involving sequences and series

## 16. Apply the Binomial Theorem

### Learning Objectives

Apply the Multiplication Principle for counting  
Apply permutations to counting arguments  
Apply combinations to counting arguments  
Compute Binomial Coefficients  
Expand a binomial to the  $n$ th power

## SCC Accessibility Statement

Disability Services provides accommodations and other supports to students with permanent and temporary disabilities that affect their SCC experience. Disabilities may include mental health (anxiety, depression, PTSD), ADHD, learning disabilities, chronic health conditions (migraine, fibromyalgia), sensory disabilities, and temporary disabilities (broken arm, surgery). Common accommodations are extended test time, private room for testing, audiobooks, and sign language interpreter.

Contact us: Faribault A116 (507) 332-5847. North Mankato E112 (507) 389-7222. [ds@southcentral.edu](mailto:ds@southcentral.edu)  
[www.southcentral.edu/disability](http://www.southcentral.edu/disability)