ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Science and Business (NSB)

COURSE: MTH 1003: College Algebra

Effective Date: Summer 2025

Submitted Date: Jan-25

Credit Hours: 3 **IAI Number (if applicable): N/A**

Complete all that apply or mark "None" where appropriate:

Prerequisite(s): MTH 0908 and MTH 0920 with a C or better; or MTH 1008 with a C or better.

Enrollment by assessment or other measure? ☒Yes ☐No

If yes, please describe: By appropriate assessment.

Corequisite(s): None.

Pre- or Corequisite(s): MTH 0103 if using MTH 1008 as the pre-req

Consent of Instructor: ☐Yes ☒No

Delivery Method:	☒**Lecture**	**3 Contact Hours** (1 contact = 1 credit hour)
	☐**Seminar**	**0 Contact Hours** (1 contact = 1 credit hour)
	☐**Lab**	**0 Contact Hours** (2-3 contact = 1 credit hour)
	☐**Clinical**	**0 Contact Hours** (3 contact = 1 credit hour)
	☐**Practicum**	**0 Contact Hours** (5 contact = 1 credit hour)
	☐**Internship**	**0 Contact Hours** (5 contact = 1 credit hour)

Offered: ☒**Fall** ☒**Spring** ☒**Summer**

CATALOG DESCRIPTION:
This course is primarily for students who need to continue on in mathematics. Topics of study include: review of fundamental algebraic operations, radicals, systems of equations, higher degree equations, inequalities, absolute values, exponential functions, logarithms functions, and matrices.

IAI Number (if applicable): N/A

ACCREDITATION STATEMENTS AND COURSE NOTES:
None.

COURSE TOPICS AND CONTENT REQUIREMENTS:

I. Fundamental Concepts of Algebra
   a. Real Number System
   b. Properties of exponents
   c. Basic operations on polynomials
   d. Factoring polynomials
   e. Simplifying rational expressions

II. Linear and Quadratic Equations and Inequalities
   a. Linear equations and their graphs and applications
   b. Quadratic equations, their graphs and applications
   c. Complex numbers
   d. Radical and Quadratic type equations
   e. Inequalities - linear, quadratic and rational

III. Functions
   a. Cartesian plane - distance formula and graphing
   b. Linear functions and their graphs
   c. Combination of functions
   d. Inverse functions
   e. Mathematical Models – variation

IV. Polynomial Functions
   a. Quadratic functions
   b. Higher degree polynomial functions
   c. Polynomial division
   d. Real zeros
   e. Complex zeros
   f. Approximation of irrational zeros

V. Other Functions
   a. Rational functions
   b. Exponential functions
   c. Logarithmic functions
   d. Properties of exponential and logarithmic functions
   e. Solving exponential and logarithmic equations
   f. Applications of rational, exponential and logarithmic functions

VI. Systems of Equations and Inequalities
   a. Systems of linear equations in two variables
   b. Systems of linear equations in three more variables
   c. Matrices used in solving linear systems of equations
   d. Systems of inequalities

INSTRUCTIONAL METHODS:
Lecture
Class discussion
Class participation
Audio-visual aids - calculator, slides, computer, etc.
Homework, Quizzes and Exams

EVALUATION OF STUDENT ACHIEVEMENT:
Unit Tests
Comprehensive final exam
Projects
MyMathLab assignments
Quizzes

INSTRUCTIONAL MATERIALS:
Textbooks
College Algebra, Blitzer, Pearson
Resources
Student Access Kit for MyLab Math
Test generation software
Printed test bank
Online Videos

LEARNING OUTCOMES AND GOALS:
Institutional Learning Outcomes
☐1) Communication – to communicate effectively.
☒2) Inquiry – to apply critical, logical, creative, aesthetic, or quantitative analytical reasoning to formulate a judgement or conclusion.
☐3) Social Consciousness – to understand what it means to be a socially conscious person, locally and globally.
☐4) Responsibility – to recognize how personal choices affect self and society.

Course Outcomes and Competencies

1. Students will be able to demonstrate knowledge of the fundamental concepts of algebra.
    1.1. Students will be able to identify the subsets of the real number system.
    1.2. Students will be able to calculate with various real numbers.
    1.3. Students will be able to simplify radical expressions and expressions involving rational exponents.
    1.4. Students will be able to perform basic operations on polynomials and special products.
    1.5. Students will be able to factor expressions.
    1.6. Students will be able to simplify fractional expressions.

2. Students will be able to demonstrate knowledge of linear and quadratic equations and inequalities.
    2.1. Students will be able to solve linear equations.
    2.2. Students will be able to solve word problems involving linear equations.
    2.3. Students will be able to solve quadratic equations.
    2.4. Students will be able to solve applied problems involving quadratic equations.
    2.5. Students will be able to solve quadratic type equations.
    2.6. Students will be able to solve radical equations.
    2.7. Students will be able to solve linear, quadratic, and rational inequalities.
    2.8. Students will be able to perform basic operations on complex numbers.

3. Students will be able to demonstrate knowledge of functions.
    3.1. Students will be able to identify functions.
    3.2. Students will be able to graph functions.
    3.3. Students will be able to identify and graph linear functions.
    3.4. Students will be able to combine functions by addition, multiplication, and composition.
    3.5. Students will be able to find the inverse of one-to-one functions.
    3.6. Students will be able to solve problems involving variation.

4. Students will be able to demonstrate knowledge of polynomial functions.
    4.1. Students will be able to identify and graph quadratics.
    4.2. Students will be able to identify and graph higher degree polynomial functions.
    4.3. Students will be able to find rational zeros of polynomial functions.
    4.4. Students will be able to find all zeros of polynomial functions.

5. Students will be able to demonstrate knowledge of other functions.
    5.1. Students will be able to identify and graph rational functions.
    5.2. Students will be able to identify and graph exponential functions.
    5.3. Students will be able to identify and graph logarithmic functions.
    5.4. Students will be able to simplify expressions using properties of exponential and logarithmic functions.
    5.5. Students will be able to solve exponential and logarithmic equations.
    5.6. Students will be able to solve applied problems using exponential and logarithmic functions.

6. Students will be able to demonstrate knowledge of systems of equations and inequalities.
    6.1. Students will be able to identify and solve systems of linear equations by substitution and graphing.
    6.2. Students will be able to solve systems of linear equations by elimination.
    6.3. Students will be able to solve systems of linear equations by Gauss-Jordan elimination.
    6.4. Students will be able to solve non-linear systems by any method.
    6.5. Students will be able to solve applied problems using systems of equations.
    6.6. Students will be able to solve systems of inequalities by graphing methods.