ILLINOIS VALLEY COMMUNITY COLLEGE

COURSE OUTLINE

DIVISION: Natural Sciences and Business

COURSE: MTH 0920 Intermediate Algebra – Foundations of STEM Mathematics

Date: Fall 2024

Credit Hours: 5

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

Prerequisite(s): MTH 0910 with a C or better

Enrollment by assessment or other measure? ☒ Yes ☐ No
If yes, please describe: Appropriate score on Accuplacer or other appropriate assessment.

Corequisite(s): None

Pre- or Corequiste(s): None

Consent of Instructor: ☒ Yes ☐ No

Delivery Method:		
☒ **Lecture**	**5 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)**

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

CATALOG DESCRIPTION and IAI NUMBER (if applicable): This course is for students planning to continue on a STEM path for degree completion. Topics of study include: systems of linear equations in 2 & 3 variables, relations & functions, compound inequalities, absolute value equations/inequalities, polynomials, factoring, rational expressions/equations; exponents, radicals, and quadratic equations & functions. The grade in this course is not computed in G.P.A. or applicable to any degree or certificate program for graduation. This course is a prerequisite for MTH-1003, MTH-1004, MTH1005, MTH-1009 or MTH-1010.

ACCREDITATION STATEMENTS AND COURSE NOTES:
Successful completion requires a C or better in the course.

COURSE TOPICS AND CONTENT REQUIREMENTS:
I. Systems of equations
    a. Solve by graphing
    b. Solve by addition
    c. Solve by substitution
    d. Applications
II. Relations & functions
    a. Relations
    b. Functions
    c. Evaluate
    d. Graphing
    e. Operations with functions
    f. Composition functions
    g. Applications
III. Compound & Absolute Value equations/inequalities
    a. Compound inequalities
    b. Absolute value equations
    c. Absolute value inequalities
    d. Graph inequalities in 2 variables
IV. Exponents & polynomials
    a. Add & subtract polynomials
    b. Multiply polynomials
    c. Divide polynomials
    d. Zero exponent
    e. Negative exponents
    f. Scientific notation
    g. Product & quotient rules for exponents
    h. Power rule for exponents
V. Factoring polynomials
    a. Greatest common factor
    b. Factor by grouping
    c. Trinomials
    d. Special products
    e. Multi-step factoring
    f. Solve equations by factoring
    g. Applications
VI. Rational expressions/equations
    a. Simplifying rational expressions
    b. Multiply & divide rational expressions
    c. Add and subtract rational expressions
    d. Solve equations containing rational expressions
    e. Applications
VII. Roots & radicals
    a. Rational exponents
    b. Simplify radicals

c. Operations with radical expressions
d. Solve radical equations
e. Complex numbers
f. Operations with complex numbers

VIII. Quadratic equations & functions
a. Square root method
b. Quadratic formula
c. Applications
d. Graphing quadratics

INSTRUCTIONAL METHODS:
Lectures
Small group/one-on-one discussion
Discussion boards
Class participation and activities
Computer assignments (homework, section videos, examples, etc.)
Quizzes
Unit Tests

EVALUATION OF STUDENT ACHIEVEMENT:
Homework assignments
Class participation and activities
Quizzes
Chapter tests
Comprehensive final exams
Computer assignments
Conferences

INSTRUCTIONAL MATERIALS:
Textbooks (E-text)
Developmental Mathematics (Martin-Gay, 4th edition, Pearson 2019)

Resources
None

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. Demonstrate the skills needed to solve systems of equations in 2 and 3 variables.
    - 1.1. Solve linear systems by graphing, addition or substitution.
    - 1.2. Determine that a linear system has no solution.
    - 1.3. Determine if a linear system has an infinite number of solutions.
    - 1.4. Use linear systems to solve real-world problems

2. Demonstrate a working knowledge of polynomials.
    - 2.1. Add and subtract polynomials.
    - 2.2. Multiply two or more polynomials.
    - 2.3. Special products.
    - 2.4. Divide polynomials.

3. Demonstrate a working knowledge of the rules of exponents.
    - 3.1 Evaluate expressions raised to zero power.
    - 3.2 Evaluate expressions raised to negative powers.
    - 3.3 Convert between scientific and standard notation.
    - 3.4 Use product and quotient rules to evaluate expressions containing exponents.
    - 3.5 Use the power rules to evaluate expressions containing exponents.

4. Demonstrate the ability to graph linear equations.
    - 4.1 Graph points on a Cartesian coordinate system.
    - 4.2 Graph linear equations in two variables.
    - 4.3 Determine the slope of a line.
    - 4.4 Determine whether two lines are parallel, perpendicular, or neither.

5. Demonstrate the ability to write equations of lines.
    - 5.1 Determine the equation of a line given two points on the line.
    - 5.2 Determine the equation of a line given the slope and one point on the line.
    - 5.3 Determine the equation of a line parallel to a given line.
    - 5.4 Determine the equation of a line perpendicular to a given line.

6. Demonstrate the ability to factor polynomials.
    - 6.1 Factor out the greatest common factor from an expression.
    - 6.2 Factor by grouping.
    - 6.3 Factor the difference of two squares.
    - 6.4 Factor the sum or difference of two cubes.
    - 6.5 Factor trinomials.
    - 6 6 Factor expressions that contain combinations of the above types of factoring.
    - 6.7 Solve quadratic equations by factoring.

7. Demonstrate the ability to manipulate rational expressions and solve equations that contain rational expressions.
    - 7.1 Identify values for which a rational expression is undefined.
    - 7.2 Simplify rational expressions.
    - 7.3 Multiply and divide rational expressions.
    - 7.4 Add and subtract rational expressions.
    - 7.5 Solve equations containing rational expressions.

7.6 Solve real-world problems involving rational expressions.

8. Demonstrate a working knowledge of functions.
    8.1 Define and identify relation and function.
    8.2 Identify domain and range.
    8.3 Evaluate functions.
    8.4 Write linear functions.
    8.5 Graph linear functions.
    8.6 Operations and composition of functions.

9. Demonstrate the ability to solve compound inequalities and absolute value equations and inequalities.
    9.1 Solve compound inequalities.
    9.2 Solve absolute value equations and inequalities.
    9.3 Graph linear inequalities in two variables.

10. Demonstrate a working knowledge of rational exponents, radicals, and complex numbers.
    10.1 Find roots.
    10.2 Use fractional exponents to simplify expressions.
    10.3 Simplify radicals.
    10.4 Perform operations with radical expressions.
    10.5 Solve radical equations.
    10.6 Write complex numbers using i notation.
    10.7 Add, subtract, multiply, and divide complex numbers.

11. Demonstrate the ability to solve quadratic equations.
    11.1 Solve quadratic equations by the square root method.
    11.2 Solve quadratic equations by the quadratic formula.
    11.3 Solve real-world problems using quadratic equation.
    11.4 Graph quadratic equations.