



# ILLINOIS VALLEY COMMUNITY COLLEGE

## COURSE OUTLINE

**DIVISION:** Natural Science & Business

**COURSE:** MTH 0920 Intermediate Algebra--Foundations of STEM Mathematics

Date: Spring 2021

Credit Hours: 3

Prerequisite(s): Appropriate score on Accuplacer or completion of MTH-0910 with a C or better

Delivery Method:

<input checked="" type="checkbox"/> Lecture	3 Contact Hours (1 contact = 1 credit hour)
<input type="checkbox"/> Seminar	0 Contact Hours (1 contact = 1 credit hour)
<input type="checkbox"/> Lab	0 Contact Hours (2-3 contact = 1 credit hour)
<input type="checkbox"/> Clinical	0 Contact Hours (3 contact = 1 credit hour)
<input checked="" type="checkbox"/> Online (VCM)	
<input type="checkbox"/> Blended	

Offered:  Fall  Spring  Summer

IAI Equivalent –**Only for Transfer Courses**-go to <http://www.itransfer.org>:

### CATALOG DESCRIPTION:

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. This course is offered in an individualized lab format in the Math Learning Center. 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, MTH-1005, MTH-1009 or MTH-1010.

## GENERAL EDUCATION GOALS ADDRESSED

*[See last page for Course Competency/Assessment Methods Matrix.]*

### Upon completion of the course, the student will be able:

*[Choose up to three goals that will be formally assessed in this course.]*

- To apply analytical and problem solving skills to personal, social, and professional issues and situations.
- To communicate successfully, both orally and in writing, to a variety of audiences.
- To construct a critical awareness of and appreciate diversity.
- To understand and use technology effectively and to understand its impact on the individual and society.
- To develop interpersonal capacity.
- To recognize what it means to act ethically and responsibly as an individual and as a member of society.
- To recognize what it means to develop and maintain a healthy lifestyle in terms of mind, body, and spirit.
- To connect learning to life.

## EXPECTED LEARNING OUTCOMES AND RELATED COMPETENCIES:

*[Outcomes related to course specific goals. See last page for more information.]*

### Upon completion of the course, the student will be able to:

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.

## MAPPING LEARNING OUTCOMES TO GENERAL EDUCATION GOALS

[For each of the goals selected above, indicate which outcomes align with the goal.]

Goals	Outcomes
First Goal	
#1: <i>Critical Thinking</i>	<ul style="list-style-type: none"> <li>• Use linear systems to solve real-world problems.</li> <li>• Determine that a linear system has no solution.</li> <li>• Determine if a linear system has an infinite number of solutions.</li> <li>• Determine the slope of a line.</li> <li>• Determine whether two lines are parallel, perpendicular, or neither.</li> <li>• Determine the equation of a line given two points on the line.</li> <li>• Determine the equation of a line given the slope and one point on the line.</li> <li>• Identify values for which a rational expression is undefined.</li> <li>• Determine the equation of a line parallel to a given line.</li> <li>• Determine the equation of a line perpendicular to a given line.</li> <li>• Solve real-world problems involving rational expressions.</li> <li>• Solve real-world problems using the quadratic formula.</li> </ul>
Second Goal	
#8: <i>To connect learning to life.</i>	<ul style="list-style-type: none"> <li>• Use linear systems to solve real-world problems.</li> <li>• Solve real-world problems involving rational expressions.</li> <li>• Solve real-world problems using the quadratic formula.</li> </ul>

### 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

### **INSTRUCTIONAL MATERIALS:**

1. Student Access Kit for ALEKS or MyMathLab
2. Textbook: Developmental Mathematics (Miller/O'Neill/Hyde 1st edition, McGraw-Hill, 2018)
3. Computer
4. Scientific calculator

### **STUDENT REQUIREMENTS AND METHODS OF EVALUATION:**

A= 91 – 100

B= 82 – 90.9

C= 74.5 – 81.9

D= 64.5 – 74.4

F= 0 – 64.4

- 1 Homework assignments
2. Class participation and activities
3. Quizzes (Quizzes are 20% of the overall grade)
4. Chapter tests – 100 points each (Tests are 60% of the overall grade)  
A minimum grade of 75% is required on each chapter test.
5. Comprehensive final exam – 100 points
6. Computer assignments
7. Conferences

### **OTHER REFERENCES**

*Beginning & Intermediate Algebra*, 6th Edition, by M. Lial, J. Hornsby, T. McGinnis

# Course Competency/Assessment Methods Matrix

MTH 0920		Assessment Options																																
For each competency/outcome place an "X" below the method of assessment to be used.	Assessment of Student Learning	Article Review	Case Studies	Group Projects	Lab Work	Oral Presentations	Pre-Post Tests	Quizzes	Written Exams	Artifact Self Reflection of Growth	Capstone Projects	Comprehensive Written Exit Exam	Course Embedded Questions	Multi-Media Projects	Observation	Writing Samples	Portfolio Evaluation	Real World Projects	Reflective Journals	Applied Application (skills) Test	Oral Exit Interviews	Accreditation Reviews/Reports	Advisory Council Feedback	Employer Surveys	Graduate Surveys	Internship/Practicum /Site Supervisor Evaluation	Licensing Exam	In Class Feedback	Simulation	Interview	Written Report	Computer Assignment		
	Direct/ Indirect	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	D	I	I	I	I	D	D							D	
1.1 solve linear systems by graphing, addition or substitution								X	X																								X	
1.2 Determine that a linear system has no solution								X	X																									X
1.3 Determine if a linear system has an infinite number of solutions								X	X																									X
1.4 Use linear systems to solve real-world problems								X	X																									X
2.1 Add and subtract polynomials								X	X																									X
2.2 Multiply 2 or more polynomials								X	X																									X
2.3 Special products								X	X																									X
2.4 Divide polynomials								X	X																									X
3.1 Evaluate expressions raised to zero power								X	X																									X







