

COURSE OUTLINE**MATHEMATICS 101**  
**Intermediate Algebra****I. Catalog Statement**

Mathematics 101 is an accelerated course of Intermediate Algebra. Topics include fundamental laws, curve plotting, linear equations, fractional exponents, quadratic equations and inequalities, arithmetic and geometric sequences and series, the binomial theorem, radical and rational expressions and equations, conic sections, factoring, functions and inverse functions, algebra of functions, graphs of functions, systems of linear and nonlinear equations and inequalities, Cramer's Rule, and exponential and logarithmic functions. This course is the equivalent of Algebra II as traditionally taught in one year of secondary school.

Total Lecture Units: 5.0

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Total Lecture Hours: 80.0 (5 hours per week)

**Total Faculty Contact Hours: 80.0 (5 hours per week)**

Prerequisite: Placement is based on a composite of test scores and academic background or satisfactory completion of Mathematics 141, 146, or two units of Mathematics 246.

Note: Students with two unsuccessful attempts in Mathematics 101 (with a grade of W, D, F, or NP) who plan to complete Intermediate Algebra will be required to take the Mathematics 119/219 and 120/220 sequence. This course may not be taken for credit by students who have completed Mathematics 120 or 220. A maximum of 5 units will be granted for Mathematics 101, 119, 120, 219 and 220. A maximum of 7 units will be granted for Mathematics 101 and 131.

**II. Course Entry Expectations**

Skill Level Ranges: Rdg 5 Wrtg 4 Lstng/Spkng 5 Math 4

Prior to enrolling in the course, the student should be able to:

1. add, subtract, multiply and divide real numbers;
2. solve linear equations and inequalities;
3. solve absolute value equations and inequalities;
4. simplify exponential expressions;
5. add, subtract, multiply and divide polynomials;
6. graph linear equations and inequalities;
7. find the equation of the line passing through 2 points;
8. solve linear systems using 3 different methods;
9. use algebra to solve applied problems;
10. use function notation;
11. factor polynomials;
12. add, subtract, multiply and divide algebraic fractions;

13. solve rational equations;
14. use algebra to solve applied problems;
15. use the properties of radicals to simplify radicals;
16. add, subtract, multiply and divide radicals;
17. solve radical equations;
18. solve quadratic equations by factoring, completing the square, and using the quadratic formula;
19. graph quadratic functions and circles,
20. use the distance formula to find the distance between two points.

### **III. Course Exit Standards**

Upon successful completion of the coursework, the student will be able to:

1. solve absolute value equations and inequalities;
2. solve linear equations and compound inequalities;
3. perform operations with polynomials;
4. simplify complex fractions;
5. perform operations with radical expressions;
6. simplify expressions with rational exponents;
7. divide synthetically;
8. solve rational equations;
9. solve equations with radicals;
10. find the equation of a line parallel or perpendicular to a given line;
11. solve a system of linear equations using elimination, substitution, and Cramer's rule;
12. solve systems of linear inequalities;
13. find the composition of two functions;
14. solve applied problems;
15. solve quadratic equations with real and complex solutions;
16. find the inverse of a function;
17. use the properties of logarithms to simplify and expand expressions;
18. solve logarithmic and exponential equations;
19. find the  $n$ th term of arithmetic and geometric sequences;
20. find the sum of a finite series and an infinite geometric series;
21. graph functions (linear, quadratic, exponential, logarithmic);
22. graph conic sections centered at any point;
23. solve a non-linear system;
24. expand the power of a binomial.

### **IV. Course Content**

**Total Contact Hours = 80**

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|--|----------|
| A. The Real Number System                          | 2 hours  |
| 1. Sets and the real number system                 |          |
| 2. Equality and properties of real numbers         |          |
| 3. Inequalities and graphs of sets of real numbers |          |
| 4. Arithmetic of real numbers                      |          |
| B. Equations and Inequalities                      | 10 hours |
| 1. Linear equations and their solutions            |          |
| 2. Applications                                    |          |

3. Formulas and literal equations
4. Absolute value equations
5. Linear inequalities
6. Inequalities with absolute values
- C. Graphs of Lines, Equations of Lines, and Variation 7 hours
  1. The rectangular coordinate system
  2. The slope of a line
  3. Equations of lines
  4. Graphs of linear inequalities in two variables
  5. Introduction to functions
  6. The algebra of functions, composition of functions
  7. Proportion and variation
- D. Systems of Equations and Inequalities 7 hours
  1. Solution by graphing
  2. Solution by substitution
  3. Solution by elimination
  4. Solution of three equations in three variables
  5. Determinants
  6. Cramer's Rule
  7. Applications
  8. Systems of linear inequalities
- E. Exponents, Polynomials, and Factoring 14 hours
  1. Exponents and scientific notation
  2. Adding and subtracting polynomials
  3. Multiplying polynomials and dividing polynomials
  4. Synthetic division
  5. The greatest common factor and factoring by grouping
  6. The difference of two squares; the sum and difference of two cubes
  7. Factoring trinomials
  8. Solving equations by factoring
  9. Applications
- F. Rational Expressions 8 hours
  1. Simplifying rational expressions
  2. Multiplying and dividing rational expressions
  3. Adding and subtracting rational expressions
  4. Complex fractions
  5. Equations containing rational expressions
  6. Applications
  7. Difference quotients
- G. Rational Exponents and Radicals 7 hours
  1. Rational exponents
  2. Radical expressions
  3. Adding and subtracting radical expressions
  4. Multiplying and dividing radical expressions
  5. Solving equations with radicals
  6. Applications of radicals
  7. Complex numbers
- H. Quadratic Equations 6 hours
  1. Completing the square

2. Quadratic formula
3. The discriminant and its applications
4. Equations quadratic in form
5. Non-linear inequalities of one variable
- I. Exponential and Logarithmic Functions 9 hours
  1. One-to-one functions
  2. Inverse functions
  3. Exponential functions
  4. Logarithmic functions
  5. Properties of logarithms
  6. Common and natural logarithms
  7. Exponential equations and change of base
  8. Solving logarithmic equations
  9. Applications
- J. The Conic Sections 5 hours
  1. Parabolas
  2. Circles
  3. Ellipses and hyperbolas
  4. Second-degree inequalities
  5. Nonlinear systems of equations and inequalities
- K. Sequences and Series 5 hours
  1. Sequences
  2. Series and summation notation
  3. Arithmetic progressions
  4. Geometric progressions
  5. The binomial expansion

## **V. Methods of Instruction**

The following instructional methodologies may be used in this course:

1. lecture/discussion;
2. collaborative learning;
3. online.

## **VI. Out of Class Assignments**

The following out of class assignments may be used in the course:

1. homework;
2. online assignments.

## **VII. Methods of Evaluation**

The following methods of evaluation may be used in the course:

1. five to eight regularly scheduled examinations;
2. one two-and-one half hour comprehensive final examination;
3. quizzes;
4. group work.

**VIII. Textbook**

McKeague, C. P., *Intermediate Algebra*. Custom Edition for GCC, 9<sup>th</sup> Edition.

Mason: Cengage Learning, 2011.

11<sup>th</sup> Grade Textbook Reading Level. ISBN: 1-111-75205-2.

**VIII. Student Learning Outcomes**

Upon successful completion of the required coursework, the student will be able to:

1. solve equations and inequalities (linear, absolute value, rational, radical, quadratic, exponential, logarithmic, systems);
2. simplify various algebraic expressions (polynomial, rational, radical, exponential, logarithmic);
3. graph various functions and relations (linear, quadratic, exponential, logarithmic, conic sections);
4. use mathematical models to solve application problems (linear, quadratic, exponential, logarithmic, systems of equations, sequences, series);
5. apply the formulas of sequences & series (arithmetic, geometric, binomial).