MATH 101 – COLLEGE ALGEBRA – SYLLABUS

Department of Mathematics
Millersville University

Description

For students who need to improve their algebraic skills before taking a higher-level course such as MATH 151, 160 or 161; focuses on algebraic topics needed for success in college mathematics and its applications. Includes the real number system, linear equations and inequalities, word problems, polynomials and factoring, rational algebraic expressions, exponents and radicals, quadratic equations, irrational equations, graphs of equations, systems of equations and logarithmic and exponential functions. (3.0 credits)

MATH 101 does **not** count towards general education. The credits for the course count toward the 120 credits needed for graduation.

Prerequisites

High school algebra I, II and geometry; math placement testing/evaluation before registration; a grade of C- or better in MATH 090.

Course Objectives

Students will develop techniques of working with exponents, linear and quadratic equations and inequalities, rational equations and inequalities, logarithms, and functions necessary for further study in mathematics. Students will show by their performance that they have acquired the study habits necessary for success in more advanced math courses. By the conclusion of this course the successful student will be able to:

- Simplify and manipulate algebraic expressions.
- Solve equations and inequalities.
- Translate word problems into mathematical language.
- Graph functions and understand the relationship between graphs, and algebraic equations, and inequalities.
- Use logarithms and exponentials.

Assessment

Assessment of student achievement of the course objectives will vary from one instructor to another. Typical assessment will be made through work in class, homework, and examinations administered in a traditional face-to-face classroom environment, in an online environment, or in a hybrid of face-to-face and online assessments.

Use of Technology

Students headed to further study in mathematics after MATH 101 will find a graphing calculator such as the Texas Instruments TI-84 useful in this and later classes. Otherwise students will be well served by a scientific calculator such as the Texas Instruments TI-30 and interactive websites such as DESMOS. Calculators with built-in computer algebra systems such as the Texas Instruments TI-Nspire may not be used on course assessments. The course instructor may require students to complete some or all assessments without the aid of a calculator.

Topics

Topics may be covered in a different order than that listed below at the instructor's discretion, so long as all topics are covered during the course.

1. **Basic Equations and Inequalities**
    a. Linear equations
    b. Absolute value equations
    c. Formulas: solving an equation for a variable
    d. Applications of linear equations
    e. Linear and absolute value inequalities
    f. Systems of linear equations
    g. Applications of systems of linear equations (recommended if time permits)
2. **Graphs, Lines, and Functions**
    a. Equations and graphs of lines
    b. Function notation, domain, and range
3. **Integer Exponents and Polynomials**
    a. Integer exponents
    b. Polynomials: addition, subtraction, multiplication, division
    c. Factoring: greatest common factor, special forms, trinomials, grouping
    d. Solving polynomial equations by factoring
4. **Rational Expressions**
    a. Rational expressions: addition, subtraction, multiplication, and division, and simplification of complex fractions
    b. Solving rational expression equations
    c. Applications of rational equations
5. **Fractional Exponents and Radicals**
    a. Roots and radicals
    b. Rational exponents
    c. Radical expressions
    d. Radical equations
    e. Rationalize fractions with radicals in the denominator
    f. Complex numbers (recommended if time permits)
6. **Quadratics**

a. Quadratic functions
b. The Quadratic Formula and completing the square
c. Applications of quadratics
d. Equations quadratic in form
e. The graph of a quadratic function
f. Solving quadratic and rational expression inequalities

7. **Functions, Exponential Functions, and Logarithms**
    a. Functions: composites and inverses
    b. Exponential functions
    c. Logarithmic functions
    d. Common and natural logarithms
    e. Solving exponential and logarithmic equations

Recently Used Textbooks

- *Intermediate Algebra* (8th edition) by Robert Aufmann and Joanne Lockwood.
- *College Algebra* (2nd edition) by Jay Abramson (OpenStax.org).