

## MATH 204 – Algebraic Foundations for the Middle Level Teacher – SYLLABUS

Department of Mathematics  
Millersville University

### Description

This course is designed for middle level (4-8) teacher candidates. It contains a concrete study of algebraic structures encountered in the middle level school mathematics curriculum. Content includes sequential patterns, and examples and properties of rings and integral domains such as the integers, integers mod  $n$ , polynomials, and matrices. (3 credits)

This course may be taken for general education credit (G2).

### Prerequisites

MATH 104 (C or better) or department permission.

### Course Objectives

By the conclusion of this course the successful student will be able to:

- Identify, represent, and construct arithmetic and algebraic patterns and sequences.
- Identify, derive and apply arithmetic and algebraic properties of the ring of integers to ring of integers modulo  $n$  to problems and proofs.
  - Identify, derive and apply arithmetic and algebraic properties of the ring of polynomials to problems and proofs.
  - Identify, derive and apply arithmetic and algebraic properties of the ring of matrices to problems, including solving systems of linear equations.
  - Develop and investigate mathematical conjectures.
  - Develop and evaluate algebraic arguments and proofs.
  - Properly communicate algebraic concepts orally and in written form using proper terminology and algebraic notation.
  - Identify and develop connections between algebraic topics and other disciplines.

### 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 examination.

## **Use of Technology**

Technology use will vary by professor.

## **Topics**

1. Patterns and Sequences
  - a. Representing Patterns and Sequences
  - b. Arithmetic Sequences
  - c. Geometric Sequences
  - d. Mathematical Induction
  - e. Fundamental Counting Principles
  - f. The Binomial Theorem
  - g.

- e. Multiplicative Inverses with Matrices
- f. Coding with Matrices
- g. Comparison of Properties of Integers and Matrices