#### MATH 310 Introduction to Mathematical Proof SYLLABUS

# Department of Mathematics Millersville University

## Description

Emphasizes mathematical reasoning and communication of mathematical ideas both orally and in writing. Symbolic logic. Techniques of mathematical proof. Algebra of sets, binary relations and functions. Infinite sets, both countable and uncountable. (3 credits)

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

#### Prerequisites

ENGL 110 and C- or higher in MATH 211.

### Course Objectives

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

Demonstrate an understanding of mathematical logic.

Compose mathematical proofs involving abstract mathematical structures that:

- o articulate ideas dearly in writing
- o demonstrate the ability to determine an appropriate method of proof
- o statements
- o reference previous definitions and theorems in their writing of proofs
- o improve as the semester progresses.

Write a minimum of 2500 words of revisable prose.

#### Assessment

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## **Topics**

- 1. Logic
  - a. Logical connectives
  - b. Truth tables
  - c. Tautologies and logical equivalence
  - d. Conditionals and biconditionals
  - e. Quantifiers
- 2. Proof techniques
  - a. Direct proof
  - b. Conditional proof
  - c. Proof by cases
  - d. Existence proofs
  - e. Induction
  - f. Counterexam@lle92 60s
- 3. Functions
  - a. Functions
  - b. Composition and inverse
  - c. Injective, surjective, and bijective functions
- 4. Set theory and cardinality

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