



**BAKER COLLEGE**  
**STUDENT LEARNING OUTCOMES**

**MTH4110 Reasoning and Proof for Elementary  
Educators**  
**3 Semester Hours**

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**Student Learning Outcomes & Enabling Objectives**

1. Apply the elements of basic set theory to construct proofs of statements involving properties of sets.
    - a. Define finite and infinite sets using various forms of notation.
    - b. Identify relationships between sets such as subsets, disjoint, and pair-wise disjoint.
    - c. Perform set operations on finite sets and an infinite collection of sets.
    - d. Recognize a partition of a given set.
    - e. Characterize well-ordered sets.
  2. Evaluate the truth value of a logical statement.
    - a. Express logical statements, such as negations, disjunctions, conjunctions, implications, or biconditionals, using appropriate mathematical notation.
    - b. Form the negation of a quantified statement.
  3. Construct mathematical proofs, including proofs of existence, using standard methods of mathematical proof including counter-examples, direct proofs, proof by contrapositive, proof by contradiction, case analysis, and mathematical induction.
    - a. Identify the hypothesis and conclusion related to a given statement.
    - b. Determine whether a conjecture is likely to be true or false.
    - c. Recognize logically equivalent statements.
    - d. Determine an appropriate logical structure for a given proof.
    - e. Explain the rationale for the structure and conclusions in a completed proof.
  4. Apply the methods of proof in areas such as basic algebra and number theory.
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## Big Ideas and Essential Questions

### Big Ideas:

- Axiomatic Systems
- Mathematical Reasoning
- Mathematical Proof

### Essential Questions:

1. How does learning to construct a mathematical proof enhance my ability to support reasoning with evidence?
2. How does proof support the development of an axiomatic system in mathematics?

These SLOs are not approved for experiential credit.

**Effective: Fall 2017**