BAKER COLLEGE
STUDENT LEARNING OUTCOMES

MTH 2410 Discrete Mathematics
3 Credit Hours

Student Learning Outcomes and Enabling Objectives

1. Apply the properties of relations, functions, and sequences to complete operations on discrete structures such as sets, functions, relations, and sequences.
    a. Define finite, infinite and power sets using various forms of notation.
    b. Identify relationships between sets such as subsets, disjoint, complements, and partitions.
    c. Perform set operations on finite sets and an infinite collection of sets such as union, intersection, and Cartesian product.
    d. Represent sets using Venn Diagrams
    e. Describe the cardinality of a finite set.
    f. Verify the mathematical properties of relations, functions, and sequences.
    g. Use the properties of relations, functions, and sequences to define a function, perform operations, identify an inverse, or find the composition.
    h. Classify functions as surjective, injective, or bijective.
    i. Use the reflexive, symmetric, and transitive properties to prove equivalence relations and partial orders.
2. Verify the correctness of an argument using propositional logic, predicate logic, and truth tables.
    a. Express logical statements, such as negations, disjunctions, conjunctions, implications, or biconditionals, using appropriate mathematical notation.
    b. Form the negation of a quantified statement.
    c. Determine the truth-value of a compound statement using truth tables.
    d. Identify the limitations of propositional and predicate logic.
    e. Apply logical principles to Boolean operations.
3. Construct mathematical proofs using counter-examples, direct proofs, proof by contrapositive, proof by contradiction, case analysis, and mathematical induction.
    a. Determine whether a conjecture is likely to be true or false.
    b. Develop a function from a recursive definition of a sequence.
    c. Identify the premise (antecedent) and conclusion (consequent), related to a given conditional or biconditional.

    d. Recognize logically equivalent statements.
    e. Determine an appropriate logical structure for a given proof.
    f. Explain the rationale for the structure and conclusions in a completed proof.
4. Apply counting techniques and combinatorics to determine discrete probability.
    a. Complete calculations using modular arithmetic.
    b. Determine the number of possible outcomes for permutations and combinations, including the application of Pascal's Identity and the binomial theorem.
    c. Apply the pigeonhole principle to counting problems and proofs.
    d. Calculate simple and compound probability.
    e. Apply Bayes' theorem to find conditional probability.
    f. Calculate expected value.
5. Model relationships using graphs and trees.
    a. Illustrate relationships using directed, undirected, weighted graphs and trees.
    b. Describe transversal strategies that can be used to determine minimizing paths in graphs and trees.

Big Ideas and Essential Questions

Big Ideas

- Discrete Structures
- Logic
- Mathematical Proof
- Combinatorics
- Discrete Probability

Essential Questions

1. How does learning to construct a mathematical proof enhance my ability to support reasoning with evidence?
2. How can mathematics be used to model discrete structures seen in the real world?

These SLOs are not approved for experiential credit.

Effective: Fall 2021