ROCHESTER COMMUNITY AND TECHNICAL COLLEGE

COMMON COURSE OUTLINE

Course discipline/number/title: MATH 2218: Discrete Mathematics

A. CATALOG DESCRIPTION
1. Credits: 4
2. Hours/Week: 4
3. Prerequisites (Course discipline/number): MATH 1115
4. Other requirements: Successful completion of prerequisite courses with a grade of C or higher
5. MnTC Goals (if any): NA

B. COURSE DESCRIPTION: This is a course for mathematics and/or computer science majors. Topics include sets, relations, symbolic language, graph theory, matrices, and Boolean algebra. College level reading skills as demonstrated by completion of READ 0900 or equivalent placement score.

C. DATE LAST REVISED (Month, year): February, 2020

D. OUTLINE OF MAJOR CONTENT AREAS:
1. Formal Logic
2. Set Theory and Elementary Number Theory
3. Proof Methods
4. Relations
5. Combinatorics and Discrete Probability
6. Graphs and Trees

E. LEARNING OUTCOMES (GENERAL): The student will be able to:
1. Apply concepts in propositional logic and predicate logic by:
   a) Creating truth tables.
   b) Using truth tables and laws of logic to determine validity of a proposition (tautology, contradiction, contingency) and logical equivalence.
   c) Verifying an argument's validity by means of truth tables and rules of inference.
   d) Interpreting and negating quantifications and nested quantifications.
2. Prove statements using mathematical induction, direct proof, proof by contraposition, proof by contradiction, and providing counterexamples.
3. Demonstrate knowledge in set theory, number theory and functions by:
   a) Determining the power set and cardinality of a set and the Cartesian Product of sets.
   b) Performing set operations and utilizing a Venn diagram to represent the combination of sets.
   c) Prove that one set is a (proper) subset of the other set or two sets are the same.
   d) Identifying types and performing operations of functions (defined with sets).
   e) Determining the explicit formulae of sequences and finding solutions of recurrence relations.
   f) Applying concepts in number theory: divisibility, representation of numbers in different bases, the greatest common divisor, the least common multiple and Euclidean Algorithm.
4. Apply concepts in relation by:
   a) Representing relations (sets, functional notations, or directed graphs).
   b) Identifying an equivalence relation and determining its equivalence classes.
   c) Identifying a partial order relation and constructing its Hasse diagram.
5. Compute combinations, permutations, discrete probability and conditional probability.
6. Develop a working knowledge of graphs, circuits, and trees related to computer science problems.
7. Analyze and implement algorithms relevant to computer science.

F. LEARNING OUTCOMES (MNTC): NA

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to:
1. Exams
2. Homework
3. Quizzes

G. METHODS FOR EVALUATION OF STUDENT LEARNING: Methods may include but are not limited to: Continued. . .
   4. Projects
   5. Comprehensive Final Exam

H. RCTC CORE OUTCOME(S). This course contributes to meeting the following RCTC Core Outcome(s): Critical Thinking. Students will think systematically and explore information thoroughly before accepting or formulating a position or conclusion.

I. SPECIAL INFORMATION (if any):
   1. A scientific calculator is necessary for many of the topics in this course.