MATH C230: INTRODUCTION TO DISCRETE MATH

Item	Value
Curriculum Committee Approval Date	04/23/2021
Top Code	170100 - Mathematics, General
Units	5 Total Units
Hours	90 Total Hours (Lecture Hours 90)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)
Local General Education (GE)	• Area 2 Mathematical Concepts and Quantitative Reasoning (CA3)

Course Description

Fundamental topics of discrete math, such as logic, proof techniques, sets, introduction to computer programming, basic counting rules, relations, functions and recursion, graphs, and probability trees. PREREQUISITE: MATH C115 or MATH C170. ADVISORY: MATH C180. Transfer Credit: CSU; UC. C-ID: MATH 160.**C-ID:** MATH 160.

Course Level Student Learning Outcome(s)

1. Write solutions to introductory combinatorial problems, using foundational techniques such as recursion, symbolic logic, Boolean algebra, set theory, matrix representation, and/or finite state machines.
2. Write proofs in introductory combinatorics, using foundational techniques such as recursion, symbolic logic, Boolean algebra, set theory, matrix representation, and/or finite state machines.

Course Objectives

- 1. Use recursion to analyze algorithms and programs;
- 2. Write proofs using symbolic logic and Boolean Algebra;
- 3. Use sets to solve problems in combinatorics and probability theory;
- 4. Apply matrices to analyze graphs and trees; and
- 5. Use finite state machines to model computer operations.

Lecture Content

Formal logic including statements, symbolic representation, tautologies, propositional logic, quantifiers, predicates, and validity, predicate logic, and logic programming. Proofs, recursion, and analysis of algorithms including proof techniques, proof by induction, proof of correctness programming, recursive definitions, recurrence relations, and analysis of algorithms. Sets, combinatorics, probability, and number theory including counting, principle of inclusion and exclusion; Pigeonhole Principle, permutations and combinations, and Binomial Theorem. Relations, functions, and matrices including relations and databases, modular arithmetic. Graphs and trees including graphs and their representations, trees and their representations, decision trees, and Huffman Codes. Graph algorithms including directed graphs and binary relations; Warshall s algorithm, Euler Path and Hamiltonian Circuit, shortest path and minimal spanning tree, traversal algorithms, and articulation points and computer networks. Boolean Algebra and computer logic including Boolean algebra structure, logic networks, and minimization. Modeling arithmetic, computation, and languages including algebraic structures, finite-state machines, and formal languages.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

Lecture, homework, quizzes, exams, discussions, projects.

Reading Assignments

Students will spend approximately 1 hour per week reading from assigned text.

Writing Assignments

Students will spend approximately 1 hour per week on writing assignments.

Out-of-class Assignments

Students will spend approximately 8 hours per week on out-of-class assignments, including reading, writing, and assigned exercises for practice.

Demonstration of Critical Thinking

Several unit written quizzes/exams and comprehensive final.

Required Writing, Problem Solving, Skills Demonstration

Several unit written quizzes/exams and comprehensive final.

Eligible Disciplines

Mathematics: Master's degree in mathematics or applied mathematics OR bachelor's degree in either of the above AND master's degree in statistics, physics, or mathematics education OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Rosen, Kenneth H. Discrete Mathematics and its Applications, 7th ed. New York: McGraw Hill, 2011 Rationale: Meets student learning outcome. 2. Required Johnsonbaugh, Richard. Discrete Mathematics, 8th ed. Pearson, 2018

Other Resources

1. Any other college level textbook supporting the learning objectives of this course. 2. Coastline Library