

## SYLLABUS

**COURSE # & TITLE:** MATH 231, Discrete Mathematics      **# OF CREDITS:** 3

### **CATALOG DESCRIPTION:**

An introductory course encompassing set theory, logic, induction and recursion, number theory, matrices, combinatorics, graph theory, trees, and models of computation. Prerequisite: Math 189 or Instructor Permission.

**Semester Offered:** Fall

**Prerequisites:** Grade of "C" or better in Math 188

#### *Common Student Learning Outcomes*

*Upon successful completion of San Juan College programs and degrees, the student will...*

<i>Learn</i>	<i>Students will actively and independently acquire, apply and adapt skills and knowledge to develop expertise and a broader understanding of the world as lifelong learners.</i>
<i>Think</i>	<i>Students will think analytically and creatively to explore ideas, make connections, draw conclusions, and solve problems.</i>
<i>Communicate</i>	<i>Students will exchange ideas and information with clarity and originality in multiple contexts.</i>
<i>Integrate</i>	<i>Students will demonstrate proficiency in the use of technologies in the broadest sense related to their field of study.</i>
<i>Act</i>	<i>Students will act purposefully, reflectively, and respectfully in diverse and complex environments.</i>

### **GENERAL LEARNING OUTCOMES:**

Upon completion of the course, the student should have a working knowledge of the following:

1. Mathematical Logic and Mathematical reasoning
2. Prime Numbers, Sequences, Factorization, Modular Arithmetic and Matrices
3. Combinatorics
4. Graphs
5. Trees
6. Basic Models of Computation

### **SPECIFIC LEARNING OUTCOMES:**

Upon completion of this course, the student should be able to:

- 1.1 Test for Propositional Equivalences using truth tables.
- 1.2 Reason using predicates and quantifiers.
- 1.3 Perform the basic operations on sets.

- 1.4 Manipulate basic discrete functions.
- 1.5 Prove propositions using mathematical induction.
  
- 2.1 Find & Apply Prime Factorizations of Numbers
- 2.2 Work with Binary, Octal & Hexadecimal Systems
- 2.3 Use Modular Arithmetic to Solve Problems
- 2.4 Handle basic integer algorithms.
- 2.5 Perform the basic operations on matrices
  
- 3.1 Perform basic counting arguments.
- 3.2 Use the Pigeon-Hole Principle.
- 3.3 Solve basic problems involving permutations and combinations.
- 3.4 Treat discrete probabilistic situations.
  
- 4.1 Determine the type of a graph.
- 4.2 Construct graphs from adjacency matrices and incidence matrices and vice-versa.
- 4.3 Analyze the path and vertex structure of a graph.
- 4.4 Work with Euler & Hamilton Paths
- 4.4 Apply graph theory to shortest path problems.
- 4.5 Treat graph coloring problems.
  
- 5.1 Model systems using trees.
- 5.2 Work with the basic tree structures.
- 5.3 Traverse trees using a variety of methods.
- 5.4 Construct spanning trees.
- 5.5 Construct minimal spanning trees using the Prim and Kruskal algorithms.
  
- 6.1 Represent regular languages using regular expressions.
- 6.2 Represent context-free languages using a grammar.
- 6.3 Manipulate finite state machines with no output and describe the languages they accept..
- 6.4 To discuss the basic classification of formal languages & the corresponding computing machines which accept them.

**Other Requirments:**

Scientific calculator.

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Date 2-12-08