

MISSOURI WESTERN STATE UNIVERSITY

COLLEGE OF LIBERAL ARTS AND SCIENCES

DEPARTMENT OF COMPUTER SCIENCE, MATHEMATICS, AND PHYSICS

COURSE NUMBER: MAT 201

COURSE NAME: Combinatorics

COURSE DESCRIPTION:

A study of the basic techniques for counting finite discrete structures subject to given constraints. Combinatorial problems from various areas of mathematics will be explored.

PREREQUISITE:

A grade of C or better in MAT 137, MAT 147, MAT 166, or MAT 167.

TEXT:

This course does not require any Textbooks

COURSE OBJECTIVES:

The main objective of this course is less about specific content and more about mode of inquiry. Central to all of mathematics is the concept of enumeration subject to given constraints. Much of this course will be comprised of problems that are, or can be thought of as, puzzles. Students will be encouraged to engage in mathematical problem-solving with creativity, flexibility, and curiosity, ultimately developing competence and confidence in approaching previously unseen problems.

COURSE OUTLINE:

Topics in the course will be selected from the following, with other topics added at the instructor's discretion:

- I. Combinatorial Proof
- II. Permutations and Combinations
- III. Fibonacci, Catalan, and Ramsey Numbers
- IV. Continued Fractions

- V. Euler Circuits
- VI. Hamiltonian Circuits and the Traveling Salesman Problem
- VII. Graph Coloring Problems
- VIII. Directed Graphs and Tournaments