Math 101 : Combinatorics

California State University, Sacramento · Department of Mathematics & Statistics

Catalog Description

Introduction to the art of counting. The focus will be on actually listing the objects being counted in small cases and using the knowledge gained in working with small cases to build toward general principles. Sum and product principles; inclusion-exclusion principle, recurrence relations, and generating functions.
Graded: Graded Student. **Units**: 3.0.

Prerequisites
Math 31

Assignments

A variety of reading and problem solving assignments will be part of the course.

Examinations

There will be regular midterm examinations and a comprehensive final examination for this course.

Course Outline

I. Elementary Counting Principles and Concepts

    A. The Rule of Sum and the Rule of Product

    B. Lists with and without repetition

    C. Permutations

    D. Combinations, Sets, and Multisets

    E. Functions

II. Binomial and Multinomial Coefficients

    A. The Choose Function

    B. Identities Involving Binomial Coefficients

    C. Counting Problems using Binomial Coefficients

    D. Pascal's Triangle

    E. Binomial and Multinomial Theorems

III. The Pigeonhole Principle

    A. Applications of the Pigeonhole Principle

    B. Elementary Ramsey Theory

IV. The Inclusion-Exclusion Principle

    A. The Inclusion-Exclusion Principle