

SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Mathematics
Title of Course: Enumerative Combinatorics

Course Number: MA548
Date: January 2011

I. Catalog Description: A study of basic enumeration techniques, recurrence relations, generating functions, the inclusion-exclusion principle, Ramsey theory, partially-ordered sets, and combinatorial designs. (3)

II. Prerequisites: MA145 Analytic Geometry & Calculus II and MA250 Foundations of Mathematics

III. Objectives of Course:

- A. To give students all the basic and several of the more advanced definitions of enumerative combinatorics.
- B. To help students develop a working knowledge of several important concepts, techniques and results common in combinatorial proofs.

IV. Expectations of Students:

- A. Students are expected to participate in classroom activities, do homework, write proofs, and pass exams.

V. Course Outline: (# class hours)

- A. Combinatorial Arguments – (6)
 - 1. Classical Models
 - 2. Identities
 - 3. Applications
- B. Recurrence Relations – (6)
 - 1. Obtaining Recurrences
 - 2. Elementary Solution Methods
 - 3. Substitution Method / Asymptotic Analysis
- C. Generating Functions – (6)
 - 1. Ordinary Generating Functions
 - 2. Coefficients and Applications
 - 3. Exponential Generating Functions
 - 4. Partitions of Integers
- D. Further Topics in Enumeration – (6)
 - 1. Inclusion-Exclusion Principle
 - 2. Permutations and Tableaux
- E. Ramsey Theory – (6)
 - 1. Pigeonhole Principle
 - 2. Ramsey's Theorem
- F. Partially Ordered Sets – (6)
- G. Combinatorial Designs – (6)
 - 1. Arrangements
 - 2. Projective Planes
 - 3. Further Constructions
- H. Examinations (3)

Total Class Hours: 45

VI. Textbook: West, Douglas. *Combinatorial Mathematics*. (This text has not yet been published. It is being used under special arrangement with the author.)

VII. Basis of Student Evaluation:

A.	Assignments	60%
B.	Hourly Exams	20%
C.	Final Exam	20%

VIII. Grading Scale

90% - 100% = A

80% - 89% = B

70% - 79% = C

0% - 69% = F

The weight of the evaluation criteria may vary according to each instructor and will be communicated at the beginning of the course.

IX. Academic Policy Statement:

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to:

<http://www6.semo.edu/judaffairs/code.html>

X. Student with Disabilities Statement:

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.