

MATH 531 Discrete Mathematics with Applications II

1. Catalog Description

MATH 531. Discrete Mathematics with Applications II

4 units

Prerequisite: [MATH 435](#) or [MATH 530](#). Corequisite: [MATH 482](#) or graduate standing in Mathematics.

Methods of discrete mathematics with applications. Polya theory, codes, designs, matroids, the combinatorics of symmetric functions, and tableaux combinatorics. Additional topics including transversals and Latin squares, asymptotics, and discrete probability theory. 4 lectures. Not open to students with credit in [MATH 436](#).

2. Required Background or Experience

Prerequisite: MATH 435 and MATH 482 or concurrent enrollment in MATH 482, or consent of instructor.

3. Learning Objectives

Upon completion of MATH 531, a student should be able to:

- a. Account for symmetry when counting objects by using Polya theory.
- b. Understand the definitions and basic facts concerning symmetric functions and their uses in connection with Young tableaux and tableaux algorithms such as RSK.
- c. Understand and apply the standard techniques of discrete mathematics to solve problems from probability theory, combinatorics, and number theory.

4. Text and References

Text to be specified by instructor. Suggested texts include:

- Graham, Ronald, [Concrete Mathematics](#)
- Hardy, G. H. and E. M. Wright, [An Introduction to the Theory of Numbers](#)
- J.H. Van Lint and R.M. Wilson, [A course in Combinatorics](#)
- R. Stanley, [Enumerative Combinatorics Vol. I and II](#)
- P. Goulden and D.M. Jackson, [Combinatorial Enumeration](#)
- G. E. Andrews. [The Theory of Partitions](#)

5. Minimum Student Materials

Paper, pencils and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content

Topics:

- a. Polya theory
- b. Codes and designs
- c. Matroids
- d. The combinatorics of symmetric functions
- e. Tableaux combinatorics
- f. Discrete probability theory and/or asymptotics and/or transversals/Latin squares and /or other advanced topics selected by instructor (time permitting)

8. Methods of Assessment

Exams, homework, and possibly student presentations.