

# Minnesota State University Moorhead

## MATH 511: Enumerative and Algebraic Combinatorics

### A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: \*.\*

Prerequisites: None

Corequisites: None

MnTC Goals: None

This course is an exploration of Combinatorics using enumerative and algebraic techniques. Topics include, but are not limited to: permutations, sets and subsets, multisets, the twelve-fold way, generating functions, recurrence relations, the principle of inclusion and exclusion, applications of group theory to counting, combinatorial designs, and error correcting codes.

**B. COURSE EFFECTIVE DATES:** 02/02/2019 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

### D. LEARNING OUTCOMES (General)

1. Apply the twelve-fold way to evaluate and solve combinatorial problems.
2. Use ordinary and exponential generating functions to analyze a combinatorial problems.
3. Apply the principle of inclusion and exclusion to solve combinatorial problems.
4. Use Polya's Theory of counting to evaluate a combinatorial object and provide an enumeration.
5. Analyze block designs and their relationship with finite geometries.
6. Understand and apply the relationship between block designs and error correcting codes.
7. Analyze linear error correcting codes and their decoding algorithms.

### E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

### F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

### G. SPECIAL INFORMATION

None noted