

Syllabus for MATH 410, Directed Project

Polynomials over finite fields

College of the Holy Cross, Spring 2023

Instructor: Dr. Neranga Fernando

Office: Swords 339

E-mail: nfernand@holycross.edu

Office phone: 508-793-2458

Office hours: Anytime I am in the office

Meeting times: TBD

Course Objectives: The student will learn the fundamentals of finite fields, algebraic properties of Dickson polynomials and reversed Dickson polynomials, and their permutation behavior over finite fields. The student will also conduct research on the number of fixed points of mappings induced by reversed Dickson polynomials over finite fields.

Recommended Reading:

1. Finite fields and applications, Gary L. Mullen and Carl Mummert, American Mathematical Society, 2007
2. R. Lidl and H. Niederreiter, Introduction to finite fields and their applications, Cambridge ; New York : Cambridge University Press, 1994.

Course materials: All announcements, materials and grades will be posted on Canvas.

Homework Assignments:

There will be five homework assignments during the semester.

Grading: The course grade will be determined as follows:

Homework: 50% (10% each)

End-of-semester presentation: 20%

End-of-semester paper: 30%

Academic Honesty:

A necessary prerequisite to the attainment of the goals of the College is maintaining complete honesty in all academic work. Students are expected to present their own work in exams and in any material submitted for credit. Students may not assist others in presenting work that is not their own. Offenders are subject to disciplinary action. A violation of the Department Policy on Academic Integrity will result in a 0 for that quiz or exam, and a letter describing the occurrence of academic dishonesty will be sent to the Chair of the Department of Mathematics and Computer Science and your Class Dean.

For more on Academic Integrity see: <https://www.holycross.edu/academics/programs/mathematics-and-computer-science/node/211581/academic-integrity>

Schedule of Topics

Algebraic Foundations

- Group Theory
- Rings and Fields
- Polynomials
- Vector Spaces

Finite fields

- Introduction
- Extension fields
- Trace and Norm

Dickson polynomials over finite fields

- Algebraic properties of Dickson polynomials
- Permutation behavior of Dickson polynomials

Reversed Dickson polynomials over finite fields

- Algebraic properties of reversed Dickson polynomials
- Permutation behavior of reversed Dickson polynomials

Research Project – *Number of fixed points of mappings induced by reversed Dickson polynomials over finite fields*