<p align="center">**Syllabus for MATH 410, Directed Project**</p>

<p align="center">**Topics in Finite Fields**</p>

<p align="center">College of the Holy Cross, Spring 2023</p>

Instructor: Dr. Neranga Fernando

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Office hours: Anytime I am in the office

Meeting times: TBD

Course Objectives: The student will learn the fundamentals of finite fields, linearized polynomials and permutation polynomials over finite fields. The student will also conduct research on permutation 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
• Bases

Linearized polynomials over finite fields

Permutation polynomials over finite fields

• Introduction
• Criteria for permutation polynomials
• Complete mappings
• Dickson polynomials
• Reversed Dickson polynomials

Research Project – *Complete permutation polynomials arising from reversed Dickson polynomials*