

Math 68008-Special Topics in Mathematics: Algebraic and Combinatorial Coding Theory

Sabancı University, Spring 2024

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Mon 12:40–15:30 FASS 1103

Objectives and Scope

The purpose of the course is to cover some recent developments and techniques in topics related to coding theory. There are recent developments both in algebraic and combinatoric methods. The mathematical techniques cover a wide scope including combinatorics, algebra, number theory, and geometry. There are close applications in various fields including physics, engineering, and computer science apart from mathematics. Some issues are quantum error correcting codes, MUBS, covering radius, decoding, MOLS, design theory, locally recoverable codes. Related background will also be presented.

Background and References

I will assume mathematical maturity. Some good references are:

1. Finite Fields: R. Lidl, H. Niederrieter, Cambridge University Press, 1997.
2. Fundamentals of Error-Correcting Codes, W. Cary Huffman and Vera Pless, 2003.
3. Handbook of Combinatorial Designs, C. J. Colbourn and J. H. Dinitz, 2007.
4. Handbook of Finite Fields, G. L. Mullen and D. Panario, 2013.

Performance Assessment:

An important part of the lectures will be projects. During the lectures, recent result in the literature will be presented and discussed. Some projects to the students will be distributed. At the end of the semester both final reports of the projects and final presentations will be evaluated. Attendance is also a required part of the course. Evaluation: Project final report 50 points, final project presentation 30 points, participation and presentation of the project during the semester 20 points.