

Course Proposal Math 585: Introduction to Coding Theory and Design Theory

Rationale:

As part of the revision of the undergraduate mathematics major, a new Applied Discrete Mathematics track is being developed. This new course would be part of this track.

Course objectives:

Coding theory and design theory are important topics at the crossroads of mathematics, statistics, electrical engineering and computer science. Codes and designs are applied, among others, in telecommunications (cell phones, data modems, internet connections), compact discs, statistical experiments, and linear regression models.

Coding theory and design theory are closely related. Designs are used to construct efficient error-correcting codes and, conversely, codes associated with designs are used to tackle some of the most difficult problems in design theory.

The objective of the course is to acquaint the students with the basic notions and with some applications of these important areas of applied mathematics.

Syllabus

Basics concepts of error-correcting codes (one week)
Perfect codes, Hamming and Golay codes (two weeks)
Linear codes and cyclic codes, BCH codes (two weeks)
Balanced incomplete block designs, finite projective geometries, Latin squares (two weeks)
Reed-Muller codes (one week)
Applications of codes and designs (two weeks)

Textbook

Raymond Hill, A First Course in Coding Theory, Oxford University Press, 1986.

Grading Scheme

Two midterms for 100 points each; final 200 points; homework 50 points.
Total: 450 points

Academic Misconduct Statement

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee. For additional information, see the Code of Student Conduct (http://studentaffairs.osu.edu/resource_csc.asp).

Disability Statement

Students with disabilities that have been certified by the Office for Disability Services will be appropriately accommodated, and should inform the instructor as soon as possible of their needs. The Office for Disability Services is located in 150 Pomerene Hall, 1760 Neil Avenue; telephone 292-3307, TDD 292-0901; <http://www.ods.ohio-state.edu/> .