Math 28: The Theory of Error-Correcting Codes
pseudo-syllabus

0. Introduction: why coding theory?
1. Linear codes: general definitions, properties, and problems
2. The geometric approach: points in near-general position in finite projective space [Goppa]
3. Weight enumerators; the MacWilliams identity and variations
4. Construction and properties of special codes and families of codes
5. As time and students’ preparation permit: further MacWilliams variations; the “linear programming” bounds; Geometry continued: curves with many points and very good codes over \(F_q^2\); nonlinear codes over \(P^1(F_q^2)\) using the same curves; other topics

Texts Much of the material will be taken from The Theory of Error-Correcting Codes by Macwilliams and Sloane. Goppa’s Geometry and Codes covers the remaining topics. These two books, as well as Introduction to Coding Theory and Algebraic Geometry by van Lint and van der Geer, are in the Birkhoff (3rd floor math) library, and can be checked out of the Cabot (Science Center) library.

Course webpage http://www.math.harvard.edu/~elkies/M256.13/

Office Hours By appointment — e-mail me at elkies@math.harvard.edu to set up a meeting time (or to ask about the course directly).

Grading If you’re taking Math 256 for a grade (i.e. are not a post-Qual math graduate student exercising your EXC option), tell me so we can work out an evaluation and grading procedure. In the past this has meant a written final project.

Note There will be no class Thursday the 12th of September. I’ll make up this class, and any that I might have to miss later in the term, during Reading Period.