

# DEPARTMENT OF MATHEMATICS

## SYLLABUS

Course # & Name: Mathematics 148: Discrete Mathematics

Recommended Text(s) & Price: Pless, Introduction to the Theory of Error-Correcting Codes, \$99

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Lecture(s)	Sections	Comments/Topics
Week 1	1.1, Appendix	Motivation; review of modular arithmetic and linear algebra over finite fields.
Week 2	1.2, 1.3	Basic definitions (code, weight, minimum distance). Main theorem of multiple-error correction.
Week 3	2.1, 2.2	Syndrome decoding; sphere packing bound; Hamming codes; perfect codes.
Week 4	2.3	Packing and covering; more bounds.
Week 5	2.4	Self-dual codes, Golay codes.
Week 6	3.1, 3.2	Definition of a field. Polynomials; factorization.
Week 7	3.3, 3.4	$F_{16}$ ; applications.
Week 8	4.1-4.3	Abelian groups, structure and classification of finite fields.
Week 9	5.1, 5.2, 4.4	Cyclic codes, factorization of $x^n - 1$
Week 10	5.3, 5.4	Cyclic codes continued

### Additional Notes:

Further topics (time permitting): Chapter 6 (QR codes) and chapter 9 (designs) would both be suitable.