

Department of Electrical and Computer Engineering
520.460 Error Control Coding

- 2004-05 Catalog: Designs of error control codes and their decoders for digital communication systems are presented in an algebraic framework. Rate, minimum distance, and error correction and detection capabilities of linear block codes are presented. Generator and parity check matrices are introduced and decoders are developed. Families of cyclic codes are presented, including BCH and Reed-Solomon codes and their decoders. Performance analyses of error control codes demonstrate the contribution of coding to communications and provided bases upon which to compare codes. (3 credit hours/Elective)
- Prerequisite(s): 550.310 Probability and Statistics for the Physical and Information Sciences and Engineering
Competence in Linear Algebra
- Textbook: *Error Control Coding*, Shu Lin and Daniel J. Costello, Prentice Hall, 2004 (required)
- Course Objectives: To learn (1) how coding improves communication and (2) how to design good codes and their decoders.
- Topics Covered:
1. Introduction
 2. Block Codes
 3. Linear Block Codes
 4. Some Important Linear Block Codes
 5. Cyclic Codes - The Basics
 6. Cyclic Codes - BCH Codes
 7. Cyclic Codes - Reed -Solomon Codes and their Relatives .
 8. Cyclic Codes having Efficient Decoders
 9. Codes without Block Structure
 10. Optimal Decoding of Convolutional Codes
 11. So-called Turbo Codes
- Class Schedule: Mon, Thurs, 2:00-3:20, 225 Barton

Contribution of Course to Meeting the Professional Component (credit hours):

Engineering Science	Engineering Science and Design
3	

Relationship of Course to Program Educational Outcomes (\checkmark those that apply):

x	Apply mathematics, probability and statistics, basic science, and computer science
	Design and conduct experiments, analyze and interpret data
x	Identify, formulate and solve electrical engineering problems
	Use technical skills and modern engineering tools to design to meet needs
	Communicate effectively and work on multidisciplinary teams
	Contemporary issues, ethical responsibilities, environmental, health, safety issues
x	Engage in life-long learning

Prepared June 1, 2005 by: A. Brinton Cooper III