

MATH 291T (3 units)

SEMINAR : CODING THEORY

M W 4:00 pm - 5:15 pm in S 139
California State University, Fresno
Fall 2011

Instructor : Dr. Stefaan Delcroix

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Office Hours : MW 2:45 pm - 3:45 pm, TTh 2:00 pm - 3:15 pm

Prerequisites : MATH 152, graduate standing

Textbook : Lecture notes, available on my web page

Course Description : basic concepts in coding theory, properties of linear and non-linear codes, standard decoding algorithms, cyclic codes.

Course Goals : The goals of this course are to

- provide students with the elementary theory of error-correcting codes.
- provide students with several examples of linear codes and decoding algorithms.
- provide students with an in-depth analysis of BCH-codes.
- create an appreciation for the value and importance of error-correcting codes.

Primary Learning Outcomes : At the completion of the course, students will be able to :

- perform calculations with the Hamming distance and Hamming weight.
- define basic concepts of linear codes.
- calculate the minimum weight of a linear code using a parity check matrix.
- perform standard array and syndrome decoding for small linear codes.
- encode and decode Hamming codes.
- decode Reed-Muller codes using majority logic decoding.

- use cyclotomic cosets to find the degrees of the irreducible factors of $x^n - 1$ over certain finite fields.
- construct BCH-codes via their generator polynomial.
- construct calculation tables for finite fields.
- perform practical calculations in finite fields to decode BCH-codes using the PGZ-algorithm and the Key Equation.

Grading Policy : I will use the following grading scheme :

		A : 85% - 100%
Homework	: 25%	B : 70% - 84%
Exam I and II	: 20% each	C : 60% - 69%
Final Exam	: 35%	D : 50%-59%
		F : 0% - 49%

Web Page : My web page is

<http://zimmer.csufresno.edu/~sdelcroix>

It will contain important information about this course : homework assignments, solutions to homeworks and exams, etc.

Homework : I will assign homework almost every wednesday. It will be posted on my website. You will have one week to hand in the homework in class. No late homework will be accepted. You may work with others in class on assignments, as this may help you to understand better the material. However, **copying someone else's assignment will not be tolerated. That is, assignments must show individual work and ideas, and your solutions must be written by you and in your own words.**

Exams and Final : There will be two in-class exams and one take-home final. Each exam will consist of two parts and cover a specific unit of material while the final is comprehensive.

No make-up exams are given unless you have an extremely good reason for not taking the exam at the scheduled time. If possible, notify me ahead of time if you will not be able to take the exam at the scheduled time.

Attendance : Attendance is required! If you are absent from class, it is your responsibility to check on announcements made while you were absent.

Students with Disabilities : Upon identifying themselves to the instructor and the university, students with disabilities will receive reasonable accommodation for learning and evaluation. For more information, contact Service to Students with Disabilities in the Henry Madden Library Suite 1202 (278-2811).

For required syllabus statements about **Students with Disabilities**, the **Honor Code**, **Cheating and Plagiarism**, **Computers**, **Disruptive Classroom Behavior**, and **Copyright Policy**: see

<http://www.csufresno.edu/academics/documents/RequiredSyllabusPolicyStatements.doc>

SUBJECT TO CHANGE

This syllabus and schedule are subject to change in the event of extenuating circumstances. If you are absent from class, it is your responsibility to check on announcements made while you were absent.

IMPORTANT DATES

Friday 9/2	Last day to add classes without instructor permission
Monday 9/5	Labor Day - no classes
Monday 9/19	Last day to add classes with permission
	Last day to drop classes without a serious and compelling reason
Thursday 9/22	Exam I
Tuesday 11/1	Exam II
Friday 11/11	Veteran's Day - no classes
Tuesday 11/15	Last day to withdraw from a class for a serious and compelling reason
Wednesday 11/23 till Friday 11/25	Thanksgiving Recess - no classes
Wednesday 12/7	Last day of instruction
Monday 12/12 till Thursday 12/15	Final semester examinations

**TAKE-HOME FINAL EXAM FOR THIS CLASS
DUE FRIDAY DECEMBER 16 IN PB 381A BY 10am**