

MATH 291T (3 units)

SEMINAR : CODING THEORY

Tu Th 5:30 pm - 6:45 pm in S2 309
California State University, Fresno
Spring 2009

Instructor : Dr. Stefaan Delcroix

Office : Peters Business 381A

Phone : (559) 278-3090

E-mail : sdelcroix@csufresno.edu

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

Office Hours : Tu We Th 4:00 pm - 5:00 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 :

- calculate the minimum weight of a linear code using a parity check matrix.
- perform syndrome decoding for small linear codes.
- encode and decode Hamming codes.
- 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.
- perform practical calculations in finite fields to decode BCH-codes.

Grading Policy : I will use the following grading scheme :

| | | |
|---------------|------------|----------------|
| Homework | : 25% | A : 85% - 100% |
| Exam I and II | : 20% each | B : 70% - 84% |
| Final Exam | : 35% | C : 60% - 69% |
| | | 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 tuesday. You will have one week to hand in the homework in class. No late homework will be accepted.

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 University Center Room 5 (278-2811).

Honor Code: Members of the CSU Fresno academic community adhere to principles of academic integrity and mutual respect while engaged in university work and related activities. You should:

- (a) understand or seek clarification about expectations for academic integrity in this course (including no cheating, plagiarism and inappropriate collaboration)
- (b) neither give nor receive unauthorized aid on examinations or other course work that is used by the instructor as the basis of grading.
- (c) take responsibility to monitor academic dishonesty in any form and to report it to the instructor or other appropriate official for action.

Cheating and Plagiarism : Cheating is the actual or attempted practice of fraudulent or deceptive acts for the purpose of improving one's grade or obtaining course credit; such acts also include assisting another student to do so. Typically, such acts occur in relation to examinations. However, it is the intent of this definition that the term 'cheating' not be limited to examination situations only, but that it include any and all actions by a student that are intended to gain an unearned academic advantage by fraudulent or deceptive means. Plagiarism is a specific form of cheating which consists of the misuse of the published and/or unpublished works of others by misrepresenting the material (i.e., their intellectual property) so used as one's own work. Penalties for cheating and plagiarism range from a 0 or F on a particular assignment, through an F for the course, to expulsion from the university. For more information on the University's policy regarding cheating and plagiarism, refer to the Class Schedule (Legal Notices on Cheating and Plagiarism) or the University Catalog (Policies and Regulations).

Computers : At California State University, Fresno, computers and communications links to remote resources are recognized as being integral to the education and research experience. Every student is required to have his/her own computer or have other personal access to a workstation (including a modem and a printer) with all the recommended software. The minimum and recommended standards for the workstations and software, which may vary by academic major, are updated periodically and are available from Information Technology Services (<http://www.csufresno.edu/ITS/>) or the University Bookstore. In the curriculum and class assignments, students are presumed to have 24-hour access to a computer workstation and the necessary communication links to the University's information resources.

Disruptive Classroom Behavior : Please turn off cell phones and pagers before entering the classroom. No talking or reading newspapers while in class. The classroom is a special environment in which students and faculty come together to promote learning and growth. It is essential to this learning environment that respect for the rights of others seeking to learn, respect for the professionalism of the instructor, and the general goals of academic freedom are maintained. ... Differences of viewpoint or concerns should be expressed in terms which are supportive of the learning process, creating an environment in which students and faculty may learn to reason with clarity and compassion, to share of themselves without losing their identities, and to develop and understanding of the community in which they live. Student conduct which disrupts the learning process shall not be tolerated and may lead to disciplinary action and/or removal from class.

Copyright policy : Copyright laws and fair use policies protect the rights of those who have produced the material. The copy in this course has been provided for private study, scholarship, or research. Other uses may require permission from the copyright holder. The user of this work is responsible for adhering to copyright law of the U.S. (Title 17, U.S. Code). To help you familiarize yourself with copyright and fair use policies, the University encourages you to visit its copyright web page:

<http://www.csufresno.edu/library/libraryinformation/campus/copyright/copyrtpolicyfull.pdf>

For copyright Questions & Answers:

<http://www.csufresno.edu/library/libraryinformation/campus/copyright/faqcopyright.pdf>

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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

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|--------------------------------|--|
| Tuesday 2/3 | Last day to add/drop classes without instructor permission |
| Monday 2/16 | President's Day - no classes |
| Tuesday 2/17 | Exam I |
| Wednesday 2/18 | Last day to add classes with permission |
| | Last day to drop classes without a serious and compelling reason |
| Thursday 3/26 | Exam II |
| Tuesday 3/31 | Cesar Chavez Holiday - no classes |
| Monday 4/6 till Friday 4/10 | Spring Recess - no classes |
| Tuesday 4/21 | Last day to drop classes for a serious and compelling reason |
| Wednesday 5/13 | Last day of instruction |
| Monday 5/18 till Thursday 5/21 | Final semester examinations |

**FINAL EXAM FOR THIS CLASS
THURSDAY MAY 21 FROM 8:00 PM TILL 10:00 PM**