Information Theory and Coding - ECEN 5622

Fall 2007, 3 credit hours, 3:00-4:15 MW ECEE 265

Instructor: Youjian Liu, youjian.liu@colorado.edu, ECOT 337, 303-735-6307

Description: An introduction to information theory, the corner stone of Information Age. The topics include entropy rates of information sources, fundamental limits of data compression, Huffman and arithmetic codes; mutual information, fundamental limits of information transmission over noisy communication channels with/without feedback. Selected topics in information storage, lossy data compression, and network information theory.

Textbook:

Required: *Elements of Information Theory, 2nd ed*, T.M. Cover and J.A.Thomas, John Wiley, 2006.

Reference, a must for research: *Information Theory and Reliable Communications*, R.G.Gallagher, Wiley, 1968.

Goals:

To provide an in-depth understanding of various information theoretic limits, including entropy, reciprocity and rate distortion function, and to discuss various applications of information theory.

Chapter 2-5, 7-10, part of 15 will be covered.

Prerequisites: ECEN 2260 and 3810.

Office Hour: 2-3pm, 4:20-5:30pm MW in my office. To make the grades fair, questions about how to solve the homework problems will be answered after the homework is turned in. Selected homework solutions will be presented in the class. However, you can ask questions if the homework problem statements themselves are not clear or ask questions on the materials in the textbook.

Homework: Homework is due every **Wednesday** at the *beginning* of the class. To be fair to those who finish the homework on time, a late homework is not accepted normally. However, all of us might have some emergency in life. So, under special circumstances discussed *in advance* with the instructor, a late homework will be accepted with 10% less points per day.

Grading:

- Homework 20% (10 pts per problem, the final HW score = Average of (Your Score of a HW/Highest Score of that HW)*100.)
- Projects 10% (depending on the level of the class, if no projects is assigned, it will be allocated to HW, Final Project Score = Your Score /Highest Score*100.)
- In Class Midterm 30% (Final Midterm Score = Your Score /Highest Score*100.)
- In Class Final 40% (Final Final-exam Score = Your Score /Highest Score*100.)

- Final Grade is calculated from the following:
100>=A>=90>=A->=85>=B+>=80>=B>=70>=B->=65>=C+>=60>=C>=50>=C->=45>=D+>=40>=D>=30>=D->=25>=F>=0

Computer Usage: Matlab

Administration Notes:

(1) If you qualify for accommodations because of a disability, please submit to me a letter from Disability Services in a timely manner so that your needs may be addressed. Disability Services determines accommodations based on documented disabilities. (303-492-8671, Willard 322, www.Colorado.EDU/disabilityservices)

(2) Students should inform the instructor well in advance about religious obligations that conflicts with scheduled exams, assignments or class attendance so that special accommodation could be discussed.

(3) The development of the Internet has provided students with historically unparalleled opportunities for conducting research swiftly and comprehensively. The availability of these materials does not, however, release the student from appropriately citing sources where appropriate; or applying standard rules associated with avoiding plagiarism. Specifically, the instructor will be expecting to review papers written by students drawing ideas and information from various sources (cited appropriately), presented generally in the student's words after careful analysis, synthesis, and evaluation. An assembly of huge blocks of other individuals' existing material, even when cited, does not constitute an appropriate representation of this expectation. Uncited, plagiarized material shall be treated as academically dishonest, and the paper will be assigned an 'F' as a result. If the student is confused as to what constitutes plagiarism, he/she should review the CU Honor Code on this topic, or see the instructor. Papers submitted by any student, written in part or in whole by someone other than that student, shall be considered to constitute fraud under the University Honor Code, and result in the assignment of an 'F' for the entire course.