**Synopsis**

Source coding (i.e. data compression) is the process of creating binary representations of the data from sources such as speech, images, audio, video or English text. This course gives a broad introduction to the theory and practice of lossy coding (i.e. quantization), where perfect reproductions are not possible or require too many bits (e.g. speech, images, audio, video) and also of lossless coding, where perfect reproductions are required (e.g. text). The lossy codes include scalar, vector, transform (e.g. JPEG, MPEG, H.26X, MP3), subband (e.g. wavelet), predictive and adaptive quantizers (e.g. CELP); and the theory is mainly high resolution quantization theory. The lossless techniques include Huffman, run-length, Lempel-Ziv, and arithmetic codes; and the theory is entropy theory. Particular attention is paid to coding speech and images. Students will gain experience in source coding through a term project. The course is oriented toward first and second year graduate students. It is a kernel course for both communications and signal processing. No previous introduction to source coding is presumed.

**Syllabus**  (attached)

**Course Details**

Time:  MWF 1:30-2:30  
Room:  2150 Dow Bldg.  
Credit hours:  3  
Likely next offering:  Winter '05  
Instructor:  Prof. David L. Neuhoff,  4215 EECS,  764-6586,  neuhoff@eecs.umich.edu  
Office hours:  To be determined. However, either now or later you can always contact me to make an appointment at a mutually convenient time.  
Prerequisite:  EECS 501, Probability and Random Processes  
Text:  None required. Lecture notes will be distributed and posted on the class website (to be constructed) as they are needed. Notes from the last offering of EECS 651 are already available on the class website (www.eecs.umich.edu/courses/eecs651). The coverage and notes this year will be similar.  
References:  To be posted on the class website.  
Books on reserve in the media union:  A list of such will be posted on the class website.  
Homework assignments:  Roughly weekly.  
Exams:  Two midterm exams at roughly one-third and two-thirds through the semester  
No final exam.
Term Project: Students will begin thinking about the project roughly halfway through the course. A written proposal will be required at the appropriate time. A written project report is due the last day of finals. Oral presentations to the class will be made at the end of the term at a time to be determined, probably be during the period of April 14 through 17. Group projects are encouraged.

Work load:

![Graph showing effort distribution](image)

Course Grade: 15% Homework, 25% Exam 1, 25% Exam 2, 35% Term Project.

Homework is important and counts enough so that you should take it seriously, but not so much that you cannot afford mistakes.

Class email list:

Many important announcements (e.g. homework hints, corrections, exam schedules, changes to office hours etc.) will be emailed to the class. **YOU MUST enroll in the class email list by sending email to**
eecs651-request@eecs.umich.edu with the word "subscribe" in the subject line. You should receive a confirming email. I will send one or more test emails, which will be announced in class. Let me know if you do not receive them. (If you have difficulties, please check to make sure have typed the address and subject line exactly as indicated above and try again. If this still doesn't work, please try again, but this time with a copy to me.)

Class web page:

www.eecs.umich.edu/courses/eecs651

It will contain homework assignments, solutions, course notes, etc.

Right now you will find it contains the Winter 2001 version. This will soon be updated.

Lecture attendance policy:

Lecture begins at 40 minutes after the hour. Please be seated and ready by then. To do otherwise is disruptive to the class.

Late homework policy:

Homework is due in class before the lecture begins on the assigned date. Please do not interrupt the lecture by attempting to hand in homework after the lecture begins. Homework received after the lecture and before the next lecture begins will incur a 25% deduction. (This is the only time that late arrival in class is penalized.) Homework received after that, but within one week of the due date, will incur a 50% deduction. No credit for homework that is more than one week late, except in extenuating circumstances.

Collaboration policy:

All homework assignments are to be completed on your own. You are allowed to consult with other students during the conceptualization of a solution, but all written work, whether in scrap or final form, is to be generated by you working alone. You are also not allowed to use, or in anyway derive advantage from,