Klipsch School of Electrical and Computer Engineering
College of Engineering
New Mexico State University

EE 573: Signal Compression, 3.0 Credits

Fall 2006

Class Schedule: MWF 2:30-3:20PM
Class Location: Thomas & Brown, Rm 307

I**nstructor:**
Dr. Charles (Chuck) Creusere
Room 160D, Goddard Annex
Phone: 646-3919
email: ccreuser@nmsu.edu

Office hour: TBA; by appointment.

Course Description:
This is an introductory graduate course in signal and data compression (i.e., source coding). We will cover the basics of lossless compression techniques (e.g., entropy coding) and various lossy quantization techniques. We will also study rate-distortion analysis of lossy compression systems. Finally, we will study how these basic techniques are combined to create standardized image, video, and audio compression algorithms like JPEG, JPEG 2000, and MPEG.

Recommended pre-/co-requisites: EE571 or equivalent: Random Processes (useful but not essential)

Textbook:

K. Sayood, *Introduction to Data Compression*, 3rd Edition, December 2005, Morgan Kauffman, ISBN 012620862X.

Other Good Reference Books:

A. Gersho and R.M. Gray, *Vector Quantization and Signal Compression*, Kluwer Academic Publishers, 1992; ISBN 0-7923-9181-0
V. Bhaskaran and K. Konstantinides, *Image and Video Compression Standards*, 2nd Edition, Kluwer Academic Publishers, Boston, MA, 1997.

D.S. Taubman and M.W. Marcellin, *JPEG2000: Image Compression Fundamentals, Standards, and Practice*, Kluwer Academic Publishers, Boston, MA, 2002.

Software:

MATLAB + Signal Processing Toolbox (available in T&B 201 and 202). Purchase of software is optional.

Online Resources: Class website

Course Objectives:

After completing this course, the student should be comfortable with the theory and practice of source coding including:

- Rate-Distortion Tradeoffs in Compression
- Scalar and Vector Quantization
- Transform coding
- Entropy Coding (Huffman & Arithmetic)
- Standardized codecs, including MPEG, JPEG, MP3

Grading:

Homeworks: There will be weekly homework assignments consisting of textbook problems and/or computer simulation projects. Worth 20% of the final grade. Late assignments will not be accepted

Project: There will be one project worth 25% of the final grade. The project will have two parts: a proposal worth 5% of the final grade and the final report/demonstration worth 20% of the final grade. You will also have to present your results during the last week of classes.

Exams: There will be 2 midterm exam, each worth 15% of the final grade (for a total of 30%). **Dates:** *TBD*

Final: The final, comprehensive examination is worth 25% of the class grade. **Date**: 1-3 PM, Wednesday, Dec, 13, 2006

Re-grading: If a student feels that the grading on any assignment or exam is in error, they must bring the problem to the instructor's attention within 1 week of receiving the graded assignment back from the instructor.

Policies:

I highly encourage you to discuss homeworks and projects with either myself or your peers. This discussion could include among other things, various approaches to a homework problem, algorithms for a software project, programming tips, and various theoretical insights. Be aware, however, that **all submitted solutions to homeworks and projects must be written or coded (in the case of software) by the individual.** There is to be no "sharing" of solutions. Any plagiarism or cheating will result in an automatic F in the course.

Students will be expected to attend at least 50% of regularly scheduled classes.

EEO/ADA Information:

Feel free to call Jerry Nevarez, Director of Institutional Equity, at 505-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.

Feel free to call Michael Armendariz, Coordinator of Services for Students with Disabilities, at 505-646-6840 with any questions you may have on student issues related to the Americans with Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will be treated confidentially.

Prepared by: C. Creusere, 08/15/06