CS 296.1 Error Correcting Codes – Course Structure

OBJECTIVES: To learn how to use memory and redundancy to achieve reliable communication, storage or computation while minimizing signal processing complexity.

GRADING: Homework (40%), Midterm (30%), Final (30%)

It will be possible to substitute a Course Project and presentation for the Final Examination. Undergraduate Course Projects are expository whereas Graduate Student Course Projects will have a research component and may if successful lead to a conference publication. Students that elect to do a Course Project will be assigned a senior graduate student of postdoctoral fellow as a guide.

Sample Undergraduate Course Project: Describe how algebraic error correction works in the Compact Disc.

Getting Started: The Compact Disc uses a variant of Reed Solomon codes called a cross-interleaved Reed-Solomon code, or CIRC. Google keywords *compact disc CIRC* will unearth some useful sources on CD technologies and systems. A good technical description of error correction can be found in

Error correction and concealment in the Compact Disc system, Hoeve, H; Timmermans, J; Vries, L B, PHILIPS TECH. REV. Vol. 40, no. 6, pp. 166-172. 1982

I design graduate student projects to take advantage of individual interests and special skills and I have posted two examples of successful graduate student projects from last year.

Recommended Books: These books are among my favorites and you may end up wanting your own copy of one or more of them. I will place copies on reserve in the library and post excerpts as appropriate, so it will not be necessary to buy any one of them. I will post slides from lectures and supplement them with my own notes.

K.A. Schouhamer Immink, *Codes for Mass Data Storage Systems*, Shannon Foundation Publishers, The Netherlands.

Richard Blahut, *Algebraic Codes for Data Transmission*, Cambridge University Press, 2003.

David J.C. MacKay*, Information Theory, Inference and Learning Algorithms*, Cambridge University Press, 2003

R.J. McEliece, *Finite Fields for Computer Scientists and Engineers*, Kluwer, 1987