University of Massachusetts Lowell
16.548 Coding and Information Theory
Thursday 6-9 PM
Office Hours Th: 4:30-6 PM and by Appointment

Instructor: Dr. Jay Weitzen
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Course Web site: http://faculty.uml.edu/jweitzen/16548/

Prerequisites: 16.362 (or equivalent), 16.363 or 16.584 (or equivalent), 16.543 or equivalent, C, java, or VB programming.

Text: Applied Coding and Information Theory for Engineers by Richard Wells, Secondary Text: A good Digital Communication Book, plus Notes each week

Introduction:

Over the past 15 years there has been a revolution in modern communication theory based on the application of information theoretic methods to coding and modulation. The result has been new techniques such as Convolutional Coding with Viterbi Decoding, Trellis Code Modulation (TCM) and Turbo coding and Modulation. In these new techniques, the coding and modulation are viewed together rather than separately, as they would have been 20 years ago.

The course begins with a development of basic information theory beginning with the definitions of information and entropy, and leading up to the derivation of the Shannon Bound on channel capacity. This is used as a basis for the development of coding techniques such as Block Codes and Convolutional codes, and the techniques used to decode them including the Viterbi algorithm.

An application of coded modulation including trellis code modulation, which is used in telephone modems and wireless systems, is analyzed. Finally, the use of convolutional codes in Turbo-modulation is discussed showing how detection at close to the Shannon Bound is possible.

Grading: This is a project-based course, with 4 projects implemented in C, java, VB, Matlab, or any other language with which you are familiar. Projects not submitted on time will be penalized 20% per week. To receive an A you must submit all projects. You may work in small groups but it is expected each of you will submit a program. Please list all contributors. While some topics may be on the Internet, if your only goal is to copy a program from the Internet and not learn anything, then please go somewhere else!!!