Planned Schedule for EECE523 Spring 2009

# Lectures	Cummulative	Dates	Topic
0.5	0.5	1/26a	**Ch. 1 Introduction**
			Lossless vs. Lossy Compression
2	2.5	1/26b, 1/28, 2/2a	**Ch. 2 Math Preliminaries for Lossless Compression**
			Appendix A: Review of Probability
			2.2 Brief Intro to Information Theory (Skip Starred Sections)
			2.3 Models
			2.4 Coding
			Uniquely Decodable Codes
			Prefix Codes
			Kraft-McMillan Inequality
0.5	3	2/2b	**Ch. 3 Huffman Coding**
			3.2 Basic Algorithm
			3.2.1 Minimum Variance Huffman Codes
			3.2.2 Optimality of Huffman Codes
			3.2.3 Length of Huffman Codes (We'll just state the result)
			3.2.4 Extended Huffman Codes
0.5	3.5	2/4a	**Ch. 4 Arithmetic Coding**
			4.2 Introduction
			4.3 Coding a Sequence
			Handout: From "Numerical Recipes" Book
			4.5 Huffman vs. Arithmetic

2	**5.5**	**2/4b, 2/9,2/11a**	**Ch. 7 Mathematical Preliminaries for Lossy Coding**
			Appendix A & Class Notes: Random Processes
			7.2 Introduction
			7.3 Distortion Criteria
			7.4 Information Theory for Lossy
			7.5 Rate-Distortion Theory
			7.6 Models
2	**7.5**	**2/11b, (2/16 no class) 2/18, 2/23a**	**Ch. 8 Scalar Quantization (SQ)**
			8.2 Introduction
			8.3 Quantization Problem
			8.4 Uniform Quantization
			8.5 Adaptive Quantization
			8.6 Nonuniform Quantization
			8.7 Entropy-Coded Quantization
1	**8.5**	**2/23b, 2/25a**	**Ch. 9 Vector Quantization (VQ)**
			9.2 Introduction
			9.3 Advantages of VQ Over SQ
			9.4 LBZ Algorithm for VQ Design
2	**10.5**	**2/25b, 3/2, 3/4a**	**Ch. 11 Math for Transforms, Subbands, and Wavelets**
			(All other sections are for Review Reading
			11.2 Introduction
			11.3 Vector Spaces (also notes on web)
			Appendix B: Matrices

3	**13.5**	**3/4b, 3/9, 3/11, 3/16a**	**Ch. 12 Transform Coding**
			12.2 Introduction
			12.3 The Transform
			12.4 Transforms of Interest
			12.5 Quantization & Coding of Coefficients
			12.6 Application to Images: JPEG
			12.7 Application to Audio
4	**17.5**	**3/16b, 3/18, 3/23, 3/25, 3/30a**	**Ch. 13 Subband Coding**
			13.2 Introduction
			13.3 Filters
			13.4 Basic Subband Algorithm
			13.5 Design of Filter Banks
			13.6 Perfect Reconstruction
			13.7 M-Band QMF Filter Banks
			13.8 **Skip This Section** (Polyphase)
			13.9 Bit Allocation
			13.10 Application: Speech
			13.11 Application: Audio
			13.12 Application: Image

4	**21.5**	**3/30b, 4/1, (Break) 4/15, 4/20, 4/22a**	**Ch. 14 Wavelet Methods**
			14.2 Introduction
			14.3 Wavelets
			14.4 Multiresolution Analysis
			14.5 Implementation via Filters
			14.6 Image Compression
			14.7 Embedded Zerotree (EZW)
			14.8 SPIHT
			14.9 JPEG 2000
2.5	**24**	**4/22b, 4/27, 4/29**	**Applications**
			16.2 Introduction
			16.3 Motion Compensation
			16.4 Video Signal Representation
			16.5 Video Conferencing
			16.6 Asymmetric Applications
			16.7 Packet Video
2	**26**	**5/4, 5/6**	**Recent Topics**
			A. Ortega and K. Ramachandran, "Rate-Distortion Methods for Image and Video Compression," *IEEE Signal Processing Magazine* , pp. 23 – 50, November 1998.