

Last year's Syllabus and Schedule

The following is the last year's (2008's) lecture-by-lecture syllabus for the course. We will cover the same material this year, though there may be some changes in ordering. Readings are from "Elements of Information Theory," by T. M. Cover and J. A. Thomas, John Wiley & Sons, 2006.

#	Date	Day	Ch.	PS out	PS due	Topics
1	1/22	T	1	1		course intro & overview, notation
2	1/24	R	2			$D(p q)$, concavity, Jensen's inequality
3	1/31	R	2			$H(X Y)$, $H(X, Y)$, $I(X; Y)$, properties
4	2/1	F	6			betting on horses
5	2/5	T	2, 4	2	1	Markov chains, entropy rate, Fano's inequality
6	2/7	R	3			typicality & AEP
7	2/12	T	5			data compression, Kraft's inequality
8	2/14	R	5	3	2	opt. prefix codes, Huffman codes
9	2/19	T	5			Huffman optimal, mismatch, uniquely decodable
10	2/21	R	2, 7	4	3	def chan, data proc, log sum, convexity of $D(p q)$
11	2/26	T	2, 7			concavity/convexity of $I(X; Y)$, joint typicality
12	2/28	R	7	5	4	channel coding theorem for DMCs
13	3/4	T	7			examples of channel capacity, converse
14	3/6	R	7	6	5	DMCs with feedback, source-channel separation
	3/11	T				midterm
15	3/25	T				linear codes: intro, can achieve capacity over BSC
16	3/27	R		7	6	more on linear codes: convolutional, LDPC
17	4/1	T	8			continuous r.v.'s: $h(X)$, AEP, $H(X^\Delta)$
18	4/3	R	8	8	7	vectors: $H(X^n)$, Gaussians, $D(f_X f_Y)$, $I(X; Y)$
19	4/8	T	9			Gaussian channel: capacity & converse
20	4/10	R	9	9	8	parallel Gaussian channels, water-filling
21	4/15	T	9			bandlimited Gaussian channels, quantization
22	4/17	R	10	10	9	rate-distortion: statement, intuition, Gaussian-MSE
23	4/22	T	10			rate-distortion: binary-Hamming, set-up achievability
24	4/24	R	10	11	10	rate-distortion: achievability & converse
25	4/29	T	11			method of types
26	5/1	R	11			large deviations: Sanov's theorem
27	5/6	T	11		11	Error exponents of ML decoding for BSC
28	5/8	R	15			intro to network information theory: BC, MAC