

**Course Outline (2009)**

Dates	Major topics	Tuesday	Thursday
March 31 – April 2	Differential Entropy (Ch.8)	Differential Entropy, $h$ , AEP	Differential Entropy, $I([X]; [Y])$
April 7 – April 9	Maximum Entropy (Ch.12)	Maximum Entropy, $f = e^{\sum \lambda_i r_i}$	Burg's Theorem, $R_0^p$ , $p^{\text{th}}$ order Gauss Markov
April 14 – April 16	Gaussian Channel (Ch.9)	Gaussian Channel Capacity, Colored Noise, Water filling	Gaussian Feedback Capacity, $C_{\text{FB}} \leq 2C$
April 21 – April 23	Network information theory (Ch.15)	Multiuuser, Multiple Access (Gaussian)	Broadcast, Interference (Gaussian)
April 28 – April 30	Network information theory	General Multiple Access	Slepian-Wolf, Superposition
May 5 – May 7	Method of Types (Ch.11)	Degraded Broadcast Channel Method of Types, $Q^n(T(P)) \doteq 2^{-nD(P  Q)}$	Large Deviations, $Q^n(E) \doteq 2^{-nD(E  Q)}$
May 12 – May 14	Rate Distortion (Ch.10)	Sanov Conditional Limit Theorem, Chernoff-Stein Lemma	(P.Cuff) Rate Distortion Theory, $R(D) = \min I(X; \hat{X})$
May 19 – May 21	Universal Data Compression (Ch.13)	(P.Cuff) Rate Distortion, Overcovering	(J.Thomas) Minimax regret $\Delta$ , Universal Codes, Minimax duality $\Delta = C$
May 26 – May 28	Portfolio Theory (Ch.16)	(J.Thomas) Arithmetic Coding, Lempel-Ziv	(T.Cover) Portfolio Theory
June 2–	Ergodic AEP (Ch.16)	(T.Cover) Portfolio Theory, Summary	