

## Tentative Syllabus and Schedule

Readings are from: (a) notes handed out in class, (b) the course textbook *Statistical Digital Signal Processing and Modeling*, Wiley, by M. Hayes, (c) the textbook *Information Theory, Inference, and Learning*, Cambridge, by D. J. Mackay, which is available on-line at [www.inference.phy.cam.ac.uk/mackay/Books.html](http://www.inference.phy.cam.ac.uk/mackay/Books.html), or (d) are noted below.

#	Date	Day	Reading	PS out	PS due	Lecture Topic
1	9/4	T	Notes I and Hayes Ch. 1, 2, 3.1-3.2			introduction and overview
2	9/6	R		1		probability review
3	9/11	T				random vectors, covariance matrices
4	9/13	R		2	1	Gaussian random vectors
5	9/18	T				abstract vector space
6	9/20	R	Notes II	3	2	vector space (cont) & estimation intro
7	9/25	T				Bayesian estimation
8	9/27	R		4	3	linear estimation
9	10/2	T				estimation examples
10	10/4	R	Ch. 3	5	4	RPs: types, SSS, WSS, covariance
11	10/9	T				RPs through linear systems
12	10/11	R		6	5	PSDs, shaping, whitening
13	10/16	T	KL handout			serial representation of RPs, KL
14	10/18	R			6	SPLIT, spectral representation
15	10/23	T	7.1-7.3	7		non-causal Wiener filter
	10/25	R				Midterm
16	10/30	T				exam recap, causal Wiener filter
17	11/1	R		8	7	prediction, smoothing, examples
18	11/6	T	7.4, Notes III			Kalman filtering
19	11/8	R		9	8	motivation: audio conferencing
20	11/13	T	9.1,9.2			steepest descent, LMS
21	11/15	R	9.4		9	RLS
22	11/20	T	3.3.6, 8.1-8.2.4	10		estimating statistics & ergodicity
23	11/22	R				No class – Thanksgiving
24	11/27	T	4.1,4.2, 4.4.3-4.4.5, 4.6, 4.7 intro, 4.7.2, 4.7.4, 4.8, 8.5 intro, 8.5.1			all-pole modeling: inverse method, (estimated) Yule-Walker equations, deterministic & stochastic cases
25	11/29	R	5.1-5.2.2, 6.1, 6.2, 6.4.1	11	10	Levinson-Durbin, lattice filters (FIR, IIR)
26	12/4	T	Jordan, 2004 Mackay Ch. 21			graphical models: intro & motivations, directed models, Bayes nets
27	12/6	R	Mackay Ch 16, 21	12	11	undirected graphs: MRFs, Ising models
28	12/11	T	Kschischang et. al, '01			factor graphs, sum-product, max-product
29	12/13	R				applications: LDPCs, secure biometrics