EE261 The Fourier Transform and its Applications
Fall 2007
Syllabus and Schedule

The following schedule is an approximation, not a contract.
Use it to plan your reading, and please read the material before coming to class.

September 24 Introductions Periodicity and Fourier series (Sections 1.1 – 1.4)	September 26 Fourier series and orthogonality Prob Set 1 handed out (Sections 1.5 – 1.9)	September 28 Fourier series, continued	Notes We won't cover Sections 1.10, 1.11 and 1.14 – 1.18 in class; inner products, convergence of Fourier series, Gibbs phenomenon
October 1 Applications of Fourier series (Section 1.13) Prob Set 2 handed out	October 3 Meet the Fourier transform Prob Set 1 due (Chapter 2)	October 5 Fourier transform properties and examples	Pay attention to "duality." We won't derive all the formulas in class – but we'll use them all. This chapter can serve as a reference
October 8 Fourier transform properties and examples, cont'd Prob Set 3 handed out (Chapter 2)	October 10 Convolution (Sections 3.1 – 3.3) Prob Set 2 due	October 12 Convolution, filters, and differential equations (Sections 3.4 – 3.5)	The last part of Section 3.5 is on diffusion of charge through a cable. We won't cover it but there's lots of history there. Ditto for 3.11
October 15 Convolution and the Central Limit Theorem (Sections 3.6, 3.7 We won't do the background on probability, so read this before class!) Prob Set 4 handed out	October 17 Distributions Prob Set 3 due (Chapter 4 Read through all this material over this series of lectures, but skip around as suits your tastes. We'll treat the math with a pretty light touch. We'll use the formulas!)	October 19 Distributions and the Fourier transform	The rigorous foundation for delta functions and the generalized Fourier transform.

October 22 Operations on distributions Prob Set 5 handed out	October 24 Distributions finis Deltas and more Prob Set 4 due	October 26 Deltas, diffraction and III (Section 5.1-5.3)	Sections 5.8 –
October 29 Sampling and interpolation (Sections 5.5-5.6) Prob Set 6 handed out	October 31 Sampling and Aliasing (Section 5.9) **Midterm Exam Outside of class Details TBA** Prob Set 5 due	November 2 The discrete Fourier transform (Section 6.1 – 6.2)	We won't cover finite sampling, Section 5.8.
November 5 Applications and properties of the Prob Set 7 handed out	November 7 Applications and properties of the DFT, cont'd Prob Set 6 due	November 9 The FFT algorithm	
	Chapter 6		
November 12 Linear systems (Sections 7.1 – 7.3) Prob Set 8 handed out	November 14 Linear time invariant systems (Sections 7. 4 – 7.8) Prob Set 7 due	November 16 Digital Filters (Section 7.13)	We won't cover Sections 7.9 – 7.12 in class; matched filters, causal signals, the Hilbert transform
	Thanksgiving Recess November 19 - 23		
November 26 Higher dimensional Fourier transforms Prob Set 9 handed out	November 28 Higher dimensional Fourier transforms,II Prob Set 8 due	November 30 Higher dimensional Fourier transforms,III	Section 8.3 is on higher dimensional Fourier series with an application to random walks
	(Sections 8.1 – 8.6; omitting 8.3)		
December 3 III and crystallography; Intro to medical imaging (Sections 8.4, 8.5)	December 5 The Radon transform & medical imaging Prob Set 9 due	December 7 The Radon transform & medical imaging, II (Sections 8.7 - 8.11)	

The Final Exam is Thursday, December 13, 8:30 – 11:30AM. Location TBA