EE-3221 Digital Signal Processing : Course Outline

Week	Day	Textbook	Topic	Lab
1	1		Syllabus, motivation for course	RT DSP Lab 1: Real-time DSP Introduction
	2	5, 8.1, 8.2.2	Review CTFT pairs & properties, impulse sampling system	
	3	8.2.3-5	Reconstruction using impulses, Nyquist-Shannon Sampling Theorem, aliasing	
2	1	8.3.1-2	Practical sampling & reconstruction using zero-order hold, quantization & coding	RT DSP Lab 2: Signal Generation and Aliasing
	2	9.2.1-2	Discrete-time signals, periodic & aperiodic signals, power & energy	
	3		(No Class - Rockwell Collins Tour)	
3	1	9.2.3-4	Even & odd signals, expansion & compression, basic discrete-time signals, representation as sum of unit sample signals	RT DSP Lab 3: Analog Input and Output
	2	9.3, 9.3.1	Discrete-time systems, linearity, time-invariance, recursive (IIR) & non-recursive (FIR) systems	
	3	9.3.2-3	Difference equations, impulse response, convolution sum	
4	1	9.3.3, 9.3.5	Convolution sum (continued), causality, stability	TBD (perhaps Quantization Error)
	2	10.1-3	Introduction to Z-transforms, relationship between Laplace transforms & Z-transforms, Z-transform of sampled signals, two-sided vs one-sided Z-transforms, poles & zeros	
	3	10.4, 10.4.1	One-sided Z-transform, region of convergence, Z-transform of basic discrete-time signals	
			Break	
5	1	10.4.3-4	Convolution sum & transfer functions, interconnection of systems	RT DSP Lab 4: Discrete Filters and Frequency Response
	2	10.5	Inverse Z-transforms	
	3	10.5.4	Solution of difference equations, Z-transform tables	
6	1		Review / catch-up	TBD
	2		TBD / catch-up	
	3	11.1, 11.2, 11.2.1	Introduction to Fourier analysis of discrete-time signals, DTFT	
7	1	11.2.3-4	DTFT computation in MATLAB, time & frequency supports	TBD (perhaps DFT and windowing)
	2	11.2.6-8	DTFT pairs & properties, magnitude & phase spectrum	
	3	11.4, 11.4.3	DFT, computation of the DFT via FFT	
8	1	11.4.5	FFT algorithm	RT DSP Lab 5: FIR Filter Design
	2	12.1-2	Introduction to discrete filter design, property of linear phase, IIR & FIR filters	
	3	12.5.1	FIR design using window design method	
9	1	12.5.2-3	Window functions, linear phase & coefficient symmetry, translating lowpass filters to bandpass/highpass filters	RT DSP Lab 6: Impulse invariance method, Bilinear transform
	2		IIR filter design using pole-zero placement	
	3	12.4.1	Impulse invariance method, Bilinear transform	
10	1	"	Bilinear transform (continued)	RT DSP Lab 7: Prototype Analog Filter Design and Real-Time Implementation
	2		Review / catch-up	
	3		Review / catch-up	

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