Boston University
Biomedical Engineering Department
BE 401 Signals and Systems in Biomedical Engineering

H.F. Voigt and S. Colburn Fall 2009

Text: Lathi HOMEWORKS GENERALLY DUE ON TUESDAY IN CLASS

Day	Date	Topic	V/C/M	Readings from text (O&Sw/N)
R	Sept. 3	Introduction to Signals (discrete and continuous); defining and combining signals; unit step and unit impulse	V (C')	Sect. 1.0 – 1.5 (pp. 1-43) Review Complex Math (x + j y) Review Matlab from EK 127
F	Sept. 4	Plotting, manipulating, and combining signals; Complex exponential signals	M (V'C')	Homework covers signal plotting and manipulating, including complex signals
T	Sept. 8	Introduction to Systems (Linear, Time-Invariant or LTI, Superposition, Convolution Sum and Integral)	C (V')	Sect. 1.6-1.7 (pp. 44-56) Sect. 2.0-2.2 (pp. 74-11)
R	Sept. 10	Time Domain Analysis of Linear Systems (Zero-input & Zero-state response review); Block Diagrams	C (V')	Sect. 2.3-2.6
F	Sept. 11	Examples of Convolution (application to ECT); Impulse response from ODE	M (V')	Homework covers convolution, including step and impulse functions
T	Sept. 15	Convolution techniques; pure (infinite) exponentials; intro to virtual sounds	C V	Practice, practice, practice
R	Sept. 17	Classical Solutions to differential and difference equations; Virtual Sound	V C	
F	Sept. 18	Examples: Applications to virtual acoustic simulations - PROJECT 1	M	Homework covers ODEs and convolution (HRTF filtering and listening) project
T	Sept. 22	Equilibrium Membrane Potentials	V	
R	Sept. 24	Cell Membrane Model Axon convolution?	V	
F	Sept. 25	Review	M	
T	Sept. 29	EXAM I	C (V')	Chapters 1 and 2 || Membrane???
R	Oct. 1	Fourier Series I (Continuous); Filtering	C (V')	Sect. 3.0 – 3.5 (pp. 177-211)
F	Oct. 2	Fourier Analysis Demos	M C V	
T	Oct. 6	Signal Approximation Orthogonal Functions	VC	Problems 3.65, 3.66, 3.69 in text
R	Oct. 8	Fourier Series II (discrete)	(C'V')	Sect. 3.6 – 3.12 (pp. 211-250)
F	Oct. 9	LTIC System Response to periodic signals	M (C'V')	Fourier series homework
T	Oct. 13	Monday Schedule (No Class)		
R	Oct. 15	Fourier Transforms (Continuous)	C	Sect. 4.0-4.8 (pp. 284-334)
F	Oct. 16	Examples of Fourier transforms	M	Homework on Fourier transforms

T	Oct. 20	Discrete-time Fourier Transfm (DTFT)	C	5.0-5.9
R	Oct. 22	Discrete Fourier Transform (DFT) FFT	C	Pages 417-420
F	Oct. 23	DFTs ... HRTFs ... Project II	M (C')	6.0-6.8
T	Oct. 27	Sampling	V C	7.0-7.6
R	Oct. 29	Window Functions; Modulation and Frequency-Division Multiplexing	V C	Pages 420-422; 8.0-8.9
F	Oct. 30	Review and examples	M	
T	Nov. 3	Lumped-parameter models (Mech.)	V C	
R	Nov. 5	EXAM 2	V	Chapters 3-8
F	Nov. 6	Spectrograms	M	
T	Nov. 10	Laplace Transforms		
R	Nov. 12	Muscle model		
F	Nov. 13	Lab or Demo or example or appl.		
T	Nov. 17	Laplace Transforms and circuits (el&me	V	9.0-9.10
R	Nov. 19	z-Transforms	C	10.0-10.10
F	Nov. 20	Modulation Lab example??	M	
T	Nov. 24	Systems analysis; Bode plots	C V	
R	Nov. 26	Fall Recess		
F	Nov. 27	Fall Recess		
T	Dec. 1		C V	
R	Dec. 3	EXAM 3	V C	Chapters 1-10; applications
F	Dec. 4	Project III	M	
T	Dec. 8	Passive elec. prop. of axon membrane	V C	
R	Dec. 10	Course Summary; Review for final	V C	
F	Dec. 11	Last Class – Review of course	V C	All material
?	Dec. X	Final Exam		All material