ECE 333 : Signals and Systems (3 credits, 3 contact hours, required course)

Instructor: Richard A Haddad; email: haddad@adm.njit.edu; Phone: 973 596 351

Text book: C.L.Phillips, J.M.Parr, E.A.Riskin, *Signals, Systems ,and Transforms,* 4th Ed, Pearson, ISBN -13: 978-0-13-198923-8

Course Description: A continuation of circuits and systems. Topics include signal models, system representations and properties, convolution, Fourier transform, sampling, and an introduction to IIR and FIR filters.

Prerequisites : ECE 232, Math 222

Specific Course Learning Outcomes, (CLO): The student will be able to:

1. understand the superposition concept in linear time-invariant (LTIV) systems
2. appreciate the role of probe signals, the impulse and the sinusoid, in generating the constituent responses of LTIV
3. understand how the Fourier transform links the time and frequency responses of LTIV
4. appreciate the linkage between differential equation description with the descriptors above.
5. understand how sampling a continuous-time signal yields the discrete-time version and the linkage between the respective FT's; the aliasing issue
6. apply the discrete-time FT and the Z transform to design FIR and IIR filters

Relevant student outcomes

(a) an ability to apply knowledge of mathematics, science and engineering (CLO)1,2,3,4,5,6

(b) an ability to design and conduct experiments as well as to analyze and interpret data (CLO) 5,6

(c) an ability to design a system, component, or process to meet desired needs within realistic constraints (CLO) 5,6

e)an ability to identify ,formulate, and solve engineering problems, CLO) 5,6

i) a recognition of the need for, and an ability to engage in life-long learning (CLO)1,2,3,4,5,6

(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice (CLO) 5,6

COURSE OUTLINE

(1) Introduction: modeling concepts, an easy read
(2) Continuous–time signals; singularity functions; Sect 2.1, 2.2, 2.4 1 week
(3) Continuous-time systems; definitions, properties, superposition, convolution; Sect 2.6, 3.1, 3.4 2 weeks
(4) Continuous–time Fourier Transform; Sect 5.1, 5.3 2 weeks
(5) Continuous-time Fourier Series; Sect 4.1, 4.4 1 week
(6) Unilateral Laplace Transform ; Sect 7.1, 7.6 1 week
(7) Discrete-time signals : classes, operations Sect 9.1, 9.6 1 week
(8) Discrete-time systems: superposition, convolution; Sect 10.1, 10.3, 10.7 2 weeks
(9) One-sided & two-sided Z transform: definition, applications; Sect 11.1, 11.4, 11.6, 11.7 2 weeks
(10) Discrete-time Fourier Transform & Fourier Series Sect 12.1, 12.2, Lecturer's Notes 2 weeks
(11) Sampling of continuous time signals: Shannon theorem, Nyquist rate ' aliasing, signal reconstruction Sect 5.4,6.4 1 week

Ground Rules

1 Homework to be assigned each week and due one week later. Solutions to be distributed at that time. Graded homework returned one week after submission.
2 Two 1.5 hour exams followed by a 3 hour final exam. An occasional spot test.
3 Course grade determined as follows:

1. Final Exam 45%
2. Semester Tests 45%
3. Homework 10%

Office Hours

Tuesdays, 2:00-3:00 PM; Wednesdays, 3:00-4:00 PM or by email appointment

Honor Code

The NJIT honor code will be upheld; any violation will be brought to the immediate

Attention of the Dean of Students

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