EE333-102: Signals and Systems Spring 2024 H. Ge

TIME & PLACE	Tuesdays/Thursdays 2:30-3:50pm, ECEC-115/FMH-205, Spring 2024.
INSTRUCTOR	Dr. Hongya Ge, Room 333, ECE Online Chat via WebEx: 8:30 - 9:30pm Thursdays. Tel: (973) 642-4990, Fax: (973) 596-5680, Email: ge@njit.edu
TA	N/A
PREREQUISITES	EE232 (Circuits and Systems), Math222 (Differential Equations)
TEXT BOOK	C. L. Phillips, J. M. Parr, Eve A. Riskin, ***Signals, Systems, and Transforms***, 3rd ed. or above. Prentice Hall. (ISBN:0-13-041207-4) B. P. Lathi, ***Linear Systems and Signals,***, 2nd, ed. or above. Oxford.
REFERENCES	• Latest version of software MATLAB (please download it from NJIT before the class). MATLAB related materials (posted on Canvas). • Course Handouts (posted on Canvas, access using UCID).
GRADING	Homework (10%), Quizzes (30%), Mid-term Exams (30%), Final (30%).
ABSTRACT	Topics covered will be signal models, LTI/LSI system representations and properties, convolution, Fourier Transform (FT), Laplace Transform (LT), sampling and spectra, DTFT, DFT, FFT, Z-Transform (ZT), and an introduction to IIR and FIR filter design. A significant portion of the course contents require MATLAB skills to engage students in hands-on learning and practice.

COURSE OUTLINE

- Week 1: Introduction: MATLAB and examples (chap. 1)
- Week 2: Continuous-time signals and systems: representations, transformations, and properties (chap. 2)
- Week 3: Linear time invariant (LTI) systems and their properties, impulse response and convolution (chap. 3)
- Week 4-5: Periodic function/signals, the Fourier series, signal spectra, and system analysis (chap. 4)
- Week 6: **Practice** and **Exam-1** on contents from chap.2 - chap.4
- Week 6-7: Fourier Transform (FT): properties, and its applications in LTI system description & analysis (chap. 5)
- Week 8: Application examples of FT: filter design, comm. and SP (ch.6)
- Week 9: NJIT Spring Break (No classes)
- Week-10: **Practice** on contents from chap. 2 - chap. 6
- Week 11: **Midterm (W/D deadline: April 1st, 2024.)**
- Week 11-13: Laplace Transform (LT): definition, properties, and its applications to LTI system analysis & filter design (chap. 7).
- Week 13-14: Nyquist Sampling Theorem, ADC/DAC, discrete-time signals & systems (chap. 9-10) FT of discrete-time signals (DTFT)
- Week 15-16: DFT, FFT in MATLAB, and Z-Transform (ZT).
- Week 17: **Final Exam**