

EE 400

1. **Course Number and Name:** EE 400, Linear Systems Theory
2. **Course Credit and Contact hours:** 3 Units, 3 hours
3. **Course Coordinator:** Dr. Mohamed Salem
4. **Textbook:** Charles L. Phillips, John M. Parr, and Eve A. Riskin, *Signals, Systems, and Transforms*, 5th Edition, Pearson, 2014. ISBN 978-0-13-350647-1.
5. **Supplemental Materials:** Software: Mathworks MATLAB or GNU Octave

6. Specific Course Information:

a. Description:

Analysis of linear time-invariant systems, correlation, convolution, impulse response, complex variables, Fourier series and transform, sampling, filtering, modulation, stability and causality, feedback and control systems, Laplace and Z-transform, and fast Fourier transforms.

b. **Prerequisites:** MATH 241 and MATH 211, or consent of instructor.

c. **Co-Requisite:** None

d. **Status:** Required for EE program, Elective, Selected Elective

7. Specific goals for the course

a. **Specific outcomes of instruction:** Upon successful completion of this course the students will be able to:

- i. Analyze linear time-invariant systems using impulse response and convolution.
- ii. Determine Fourier series for periodic signals.
- iii. Determine Fourier transform and inverse Fourier transform for signals.
- iv. Determine Laplace transform and inverse Laplace transform for signals.
- v. Analyze linear time-invariant systems using frequency domain methods.
- vi. Understand sampling and the sampling theorem.
- vii. Determine Z-transform and inverse Z-transform for discrete-time signals.

b. This course supports the following ABET Student Outcomes

- i. *SO-1: an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.*

8. Brief list of topics to be covered:

- a. Introduction to signals and systems
- b. Linear time-invariant systems properties
- c. Time-domain analysis of linear time-invariant systems
- d. Fourier representation of signals
- e. Fourier transform
- f. Sampling
- g. Laplace transform
- h. Z-transform