Philadelphia University

Faculty of Engineering and Technology
Department of Communication and Electronics Engineering

Course Information

Title: Signal Processing for Mechatronics (0640543)

Prerequisite: Digital Control (0640441)

Credit Hours: 3 credit hours (16 weeks per semester, approximately 44 contact hours)

Textbook: "Signals & Systems," A. V. Oppenheim, A. S. Wilsky, and S. H. Nawab, (Pearson New International Edition), 2013

References:

- "Fundamentals-of-Signals-and-Systems-Using-the-Web-and-MATLAB", Edward W. Kamen & Bonnie S Heck, Pearson-New-International-Edition, 2013.
- "Signals & Systems", Simon Haykin & Barry Van Veen, 2nd edition, Wiley, 2002.
- "Signals and Systems: Continuous and Discrete" R. Ziemer, W. Tranter and D. Fannin, Macmillan Pub, 1993.

Catalog Description: The course is a requirement for Electrical, Communication and Electronics engineering students. It introduces the modeling and analysis of Signals and Systems both continuous and discrete, in the time and frequency domains. Topics include theory and application of Fourier series, Fourier transform, the Convolution operation and Laplace Transform in communication systems.

Website: http://www.philadelphia.edu.jo/academics/qhamarsheh

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Course Topics

Week	Topic
1,2,3,4	**Continuous-Time Signals:** (Basic Continuous-Time Signals, Continuous-Time Convolution)
5,6,7	**Discrete-Time Signals:** (Basic Discrete-Time Signals, Discrete-Time Convolution)
8,9,10	**Linear Time-Invariant Systems (LTI):** (System Attributes, Impulse Response, Differential and Difference Equations)
11,12,13	**Fourier Analysis for Continuous-Time Signals:** (Periodic Signals and Fourier Series, Continuous-Time Fourier Transform, Properties and Applications of the Fourier Transform, Frequency Response of LTI Systems)
14,15	**The Laplace Transform:** (The Region of Convergence, The Inverse Laplace Transform, Properties of the Laplace Transform, The System Function of LTI Systems, Applications of L.T.)
16	**Review, and final exam**

Course Learning Outcomes and Relation to ABET Student Outcomes:

Upon successful completion of this course, a student should be able to:

1.	Understand the concept of a signal and a system, plot continuous-time signals, and evaluate the periodicity of a signal.	[1]
2.	Identify properties of continuous-time systems such as linearity, time-invariance, stability, and causality.	[1]
3.	Understand the convolution of continuous and discrete-time signals.	[1]
4.	Understand the concept of the impulse response function of a linear system, and its use to describe the input/output relationship.	[1]
5.	Compute the Fourier series representation of a periodic function.	[1]
6.	Evaluate the Fourier transform of a continuous function, and be familiar with its basic properties.	[1]
7.	Compute the Laplace transform of a continuous function, identify its domain of convergence, and be familiar with its basic properties.	[1]

Assessment Instruments:

Evaluation of students' performance (final grade) will be based on the following categories:

Exams: Two written exams will be given. Each will cover about 4-weeks of lectures

Quizzes: 10-minute quizzes will be given to the students during the semester. These quizzes will cover material discussed during the previous lecture(s).

Homework: Problem sets will be given to students. Homework should be solved individually and submitted before the due date.

Copying homework is forbidden, any student caught copying the homework or any part of the homework will receive zero mark for that homework

Final Exam: The final exam will cover all the class material.

Grading policy:

Mid Exam	30%
Quizzes and Homework	30%
Final Exam	40%
Total:	100%

Attendance policy:

Absence from classes and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse, acceptable to and approved by the Dean of the relevant college/faculty, shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.