King Saud University

College of Computer and Information Sciences

Department of Computer Engineering

1. Course number and name: **CEN 340, Signals and Systems**

2. Credits and contact hours: **3 (3, 0, 1)**

3. Instructor's or course coordinator's name: Abdulwadood Abdulwaheed

4. Text book, title, author, and year:

   Signals and Systems, Oppenheim A. and Willsky A. with S. Nawab, 2nd Ed., 1997, Prentice Hall.

   a. other supplemental materials:

   Fundamentals of Signals and Systems Using the Web and Matlab, E. W. Kamen and B. S. Heck., 3rd Ed., 2007, Prentice Hall

   Communication Systems, Haykin, S., 4th Edition, 2001, John Wiley & Sons, New York.

5. Specific course information

   a. Course description (catalog)

   Mathematical description and classification of various signals and systems: introduction to mathematical software packages (e.g. MATLAB), continuous linear time-invariant systems, convolution and correlation, Fourier series and transforms, Laplace transform, applications to communication systems: modulation/demodulation of AM, double sideband suppressed carrier, single sideband, and FM/PM systems.

   b. prerequisites or co-requisites: MATH 204 (prerequisite).

   c. Required, elective, or selected elective course: Required.

6. Specific goals for the course

a. Course Learning Outcomes: This course requires the student to demonstrate the following

1. Use of MATLAB software for simulation of signals and systems.
2. Signal classification, sketching and basic time-domain operations.
3. Perform convolution for continuous time signals.
4. Determine if a system is linear, time-invariant, causal, memoryless, stable and invertible.
5. Describe a linear time-invariant system by its impulse/step response, differential/difference equation, and block diagram.
6. Apply the basic definitions of the Fourier series, Fourier transform and Laplace transform along with the inverse transforms.

b. Relationship of Course to Student Outcomes

Outcome	Student Outcome Description	Contribution
(a)	an ability to apply knowledge of mathematics, science, and engineering	√
(b)	an ability to design and conduct experiments, as well as to analyze and interpret data	
(c)	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	
(d)	an ability to function on multidisciplinary teams	
(e)	an ability to identify, formulate, and solve engineering problems	√
(f)	an understanding of professional and ethical responsibility	
(g)	an ability to communicate effectively	
(h)	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	
(i)	a recognition of the need for, and an ability to engage in life-long learning	√
(j)	a knowledge of contemporary issues	
(k)	an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

7. Brief list of topics to be covered and schedule in weeks

Introduction to MATLAB	1
Signal classification and basic operations on signals	3
Time-domain Analysis of signals and systems	2
Fourier Representations of signals and systems	2
Applications of Fourier Representations	2
Laplace transform and its applications	2
Modulation /demodulation of AM/FM signals	2
Review and evaluation	1