جامعة الملك عبدالله
للعلوم والتقنية
King Abdullah University of
Science and Technology

Course Syllabus: Signal and Systems I - EE 151

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 151
Course Title	Signal and Systems I
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	01:00 PM - 02:30 PM | Mon Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Ahmed Sultan Salem	Ahmed.Salem@kaust.edu.sa	+966128080416	3134, 1, Al-Khawarizmi (bldg. 1)	TBD

Teaching Assistant(s)

Name	Email
TBD	TBD

Course Information

Comprehensive Course Description	EE 151 covers the fundamentals of signal and system analysis tackling both continuous-time (CT) and discrete-time (DT) systems. The course provides the necessary background needed for understanding analog and digital signal processing, automatic control, analog and digital communications, and probability and random processes. The course focuses on the study of linear time-invariant (LTI) systems and their analysis in the time domain or in the frequency domain. Fourier analysis in EE 151 includes Fourier series for periodic continuous-time signals, the continuous-time Fourier transform (CTFT) and the discrete-time Fourier transform (DTFT). In addition, the course includes a chapter on the z-transform.
Course Description from Program Guide	Introduction to analog and digital signal processing, a topic that forms an integral part of engineering systems in many diverse areas, including seismic data processing, communications, speech processing, image processing, defense electronics, consumer electronics, and consumer products. The course presents and integrates the basic concepts for both continuous-time and discrete-time signals and systems. It addresses the following topics: classifications of signals and systems, basic signal operations, linear time-invariant (LTI) systems, time-domain analysis of LTI systems, signal representation using Fourier series, continuous-time Fourier transform, discrete-time Fourier transform, and Laplace transform.

Goals and Objectives	At the end of this course, students should: 1. Understand the basic concepts for continuous-time and discrete-time signals and systems. 2. Understand linear time-invariant systems and their characterization using impulse response. 3. Be able to compute the output of a continuous-time or discrete-time linear time-invariant system using convolution in the integral or sum form. 4. Understand Fourier series for the analysis and representation of periodic continuous-time signals. 5. Understand the representation of signals using a countably infinite orthogonal basis. 6. Understand the actual meaning of the Fourier series and its infinite sum. 7. Be able to develop the continuous-time Fourier transform from the Fourier series and understand related topics such as time scaling, convolution theorem, Parseval's relation, uncertainty principle and eigenfunctions of the Fourier operator. 8. Understand the discrete-time Fourier transform and its properties. 9. Understand the z-transform, its properties and concepts such as the region of convergence.
Required Knowledge	Calculus and basic concepts of linear algebra
Reference Texts	**Textbook:** Continuous and Discrete Time Signals and Systems by Mrinal Mandal, Amir Asif **References:** * Signals and Systems (2nd Edition) by Alan V. Oppenheim, Alan S. Willsky with S. Hamid * Signals and Systems using MATLAB (2nd Edition) by Luis Chaparro * Transforms in Signals and Systems by Peter Kraniauskas
Method of evaluation	**25.00**% - Final exam **25.00**% - Midterm exam **50.00**% - Homework /Assignments
Nature of the assignments	Problem sets. The time allocated to an assignment may vary depending to its difficulty and the required amount of work. Students are encouraged to try the homework problems on their own, and then refine their comprehension of technical material with other students.
Course Policies	. Late homework submissions are not accepted.
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Mon 08/26/2019 Thu 08/29/2019	Introduction
2	Mon 09/02/2019 Thu 09/05/2019	Classification of signals
3	Mon 09/09/2019 Thu 09/12/2019	Dirac delta Upsampling and downsampling in discrete-time systems
4	Mon 09/16/2019 Thu 09/19/2019	Classification of systems Linear time-invariant systems
5	Mon 09/23/2019 Thu 09/26/2019	Continuous-time and discrete-time convolution
6	Mon 09/30/2019 Thu 10/03/2019	Series representation of signals
7	Mon 10/07/2019 Thu 10/10/2019	Fourier series
8	Mon 10/14/2019 Thu 10/17/2019	Fourier series: advanced topics
9	Mon 10/21/2019 Thu 10/24/2019	Continuous-time Fourier transform and its properties
10	Mon 10/28/2019 Thu 10/31/2019	Uncertainty principle Eigenfunctions of Fourier transform
11	Mon 11/04/2019 Thu 11/07/2019	Discrete-time Fourier transform
12	Mon 11/11/2019 Thu 11/14/2019	Properties of discrete-time Fourier transform
13	Mon 11/18/2019 Thu 11/21/2019	z-transform
14	Mon 11/25/2019 Thu 11/28/2019	Properties of the z-transform
15	Mon 12/02/2019 Thu 12/05/2019	Review
16	Mon 12/09/2019	-

Note

The instructor reserves the right to make changes to this syllabus as necessary.