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

Course Syllabus: Signal and Systems II - EE 152

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 152
Course Title	Signal and Systems II
Academic Semester	Spring
Academic Year	2017/2018
Semester Start Date	01/28/2018
Semester End Date	05/24/2018
Class Schedule (Days & Time)	02:30 PM - 04:00 PM | Mon Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Ahmed Sultan Salem	Ahmed.Salem@kaust.edu.sa	+966128080416		Office: 3134 Khawarizmi West Office hours: TBD

Teaching Assistant(s)

Name	Email
TBD	TBD

Course Information

Comprehensive Course Description	This course builds upon the material investigated in EE 151 (Signals and Systems I) and addresses the following topics: z-transform, sampling and quantization, continuous-time filters, digital filters, finite impulse response (FIR) filter design, infinite impulse response (IIR) filter design, and applications of digital signal processing.
Course Description from Program Guide	This course builds upon the material investigated in EE151 and addresses the following topics: z-transform, continuous-time filters, digital filters, finite impulse response (FIR) filter design, infinite impulse response (IIR) filter design, sampling and quantization, and applications of digital signal processing including spectral estimation, digital audio, audio filtering, and digital audio compression.

Goals and Objectives	At the end of this course, students should: 1. Understand the z-transform and how it is applied to discrete-time systems. 2. Understand the properties of the z-transform and how it is related to the discrete-time Fourier transform (DTFT). 3. Understand the class of bandlimited signals and their properties. 4. Understand the sampling of continuous-time signals and the conditions needed for perfect reconstruction. 5. Understand the quantization of signals and be able to analyse the associated quantization error. 6. Understand the operation of continuous- and discrete-time filters. 7. Understand the mathematics underlying filter design, e.g. Chebyshev polynomials. 8. Be able to design continuous-time filters. 9. Be able to design finite impulse response (FIR) and infinite impulse response (IIR) discrete-time filters. 10. Understand filtering in the context of some applications such as analog-to-digital and digital-to-analog conversion.
Required Knowledge	- Fourier analysis (Fourier series, continuous-time Fourier transform, discrete-time Fourier transform) - Linear time-invariant system theory - Calculus
Reference Texts	*-Required Textbook:* Continuous and Discrete Time Signals and Systems by Mrinal Mandal, Amir Asif *-Reference Books:* * 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	8 to 10 problem sets. Students are required to solve about 8 problems weekly. The assignments involve Matlab-based problems.
Course Policies	Late submissions are not accepted.
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Mon 01/29/2018 Thu 02/01/2018	z-transform.
2	Mon 02/05/2018 Thu 02/08/2018	Poles and zeros. Bounded-input, bounded-output stability. Final value theorem.
3	Mon 02/12/2018 Thu 02/15/2018	All-pass systems. Minimum-phase systems. Upsamplers and downsamplers.
4	Mon 02/19/2018 Thu 02/22/2018	Sampling theorem.
5	Mon 02/26/2018 Thu 03/01/2018	Poisson summation formula. Sampling of sinusoidal signals.
6	Mon 03/05/2018 Thu 03/08/2018	Quantization.
7	Mon 03/12/2018 Thu 03/15/2018	Signal flow graphs.
8	Mon 03/19/2018 Thu 03/22/2018	Group delay.
9	Mon 03/26/2018 Thu 03/29/2018	Continuous-time filters. Chebyshev polynomials.
10	Mon 04/02/2018 Thu 04/05/2018	Spring Break
11	Mon 04/09/2018 Thu 04/12/2018	Linear-phase and symmetry in finite-impulse response discrete-time filters.
12	Mon 04/16/2018 Thu 04/19/2018	Window design method.
13	Mon 04/23/2018 Thu 04/26/2018	Alternation theorem and minimax approximation.
14	Mon 04/30/2018 Thu 05/03/2018	Parks-McClellan filter design.
15	Mon 05/07/2018 Thu 05/10/2018	IIR filters. Rounding effects.
16	Mon 05/14/2018 Thu 05/17/2018	Interpolation.
17	Mon 05/21/2018 Thu 05/24/2018	Final exam.
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Note

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