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	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	01:00 PM - 02:30 PM | Sun 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: Monday and Wednesday 12:30--4:30 PM

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: sampling and quantization, discrete Fourier transform, 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 class of bandlimited signals and their properties. 2. Understand the sampling of continuous-time signals and the conditions needed for perfect reconstruction. 3. Understand the quantization of signals and be able to analyze the associated quantization error. 4. Understand the discrete Fourier transform (DFT). 5. Understand the fast Fourier transform (FFT). 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), z-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**% - Exam 2 **50.00**% - Homework /Assignments **25.00**% - Exam 1
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	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. Late homework submissions are not accepted. Using material from previous EE 152 offerings is totally prohibited.
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Sun 01/27/2019 Thu 01/31/2019	Sampling theorem
2	Sun 02/03/2019 Thu 02/07/2019	Poisson summation formula, sampling of sinusoidal signals
3	Sun 02/10/2019 Thu 02/14/2019	Uniform and optimal quantization
4	Sun 02/17/2019 Thu 02/21/2019	Sampling in the frequency domain
5	Sun 02/24/2019 Thu 02/28/2019	Discrete Fourier transform (DFT)
6	Sun 03/03/2019 Thu 03/07/2019	Properties of DFT
7	Sun 03/10/2019 Thu 03/14/2019	Fast Fourier transform
8	Sun 03/17/2019 Thu 03/21/2019	Group delay.
9	Sun 03/24/2019 Thu 03/28/2019	Spring break
10	Sun 03/31/2019 Thu 04/04/2019	Continuous-time filters. Chebyshev polynomials.
11	Sun 04/07/2019 Thu 04/11/2019	Linear-phase and symmetry in finite-impulse response discrete-time filters.
12	Sun 04/14/2019 Thu 04/18/2019	Window design method.
13	Sun 04/21/2019 Thu 04/25/2019	Alternation theorem and minimax approximation.
14	Sun 04/28/2019 Thu 05/02/2019	Parks-McClellan filter design.
15	Sun 05/05/2019 Thu 05/09/2019	IIR filters. Rounding effects.
16	Sun 05/12/2019 Thu 05/16/2019	Interpolation.
17	Sun 05/19/2019 Thu 05/23/2019	Final exam.

Note

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