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

Course Syllabus: Integrated Sensors - EE 310

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 310
Course Title	Integrated Sensors
Academic Semester	Summer
Academic Year	2018/2019
Semester Start Date	06/16/2019
Semester End Date	08/08/2019
Class Schedule (Days & Time)	09:00 AM - 12:00 PM | Tue Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Khaled Nabil Salama	khaled.salama@kaust.edu.sa	+966128084420	3277, 3, Ibn Sina (bldg. 3)	Sunday 9am
Jurgen Kosel	jurgen.kosel@kaust.edu.sa	+966128084360	3219, 3, Ibn Sina (bldg. 3)	Sun 9am

Teaching Assistant(s)

Name	Email

Course Information

Comprehensive Course Description	**We will present the design and implementation of monolithic and hybrid sensors using integrated circuits, particularly in CMOS. We will begin by providing the definitions and performance metrics of sensors. Subsequently, we will discuss the advantages and shortcomings of sensors built in silicon-based fabrication processes and examine, in detail, their integrated circuit topologies. Next, we will provide a comprehensive study of the design and analysis of CMOS integrated image sensors, integrated biosensors, and electronic backbone of MEMS hybrid sensors including silicon photodetectors; CCD and CMOS sensor architectures and circuits; affinity-based detection and biochemical transduction, integrated microarrays, biochips, and sensor SoCs.**
Course Description from Program Guide	The design and implementation of monolithic and hybrid sensors using integrated circuits, particularly in CMOS is presented. Performance metrics of sensors will be defined. The advantages and shortcomings of sensors built in silicon-based fabrication processes will be analyzed. A comprehensive study of the design and analysis of CMOS integrated image sensors, integrated biosensors, and electronic backbone of MEMS hybrid sensors including silicon photodetectors; CCD and CMOS sensor architectures and circuits; affinity-based detection and biochemical transduction, integrated microarrays, biochips, and sensor SoCs will be studied.
Goals and Objectives	1- The ability to compare various sensors 2- The ability to understand the operation of sensors 3- The ability to present their work to a wide audience
Required Knowledge	Basic Physics, material science and electrical engineering.
Reference Texts	1- lecture notes handed in class 2- Wikipedia pages for sensor project ideas 3- no text book
Method of evaluation	**20.00**% - Others - Please specify **80.00**% - Quiz(zes)

Nature of the assignments	There are 4 quizzes during the semester and a lab
Course Policies	
Additional Information	

Tentative Course Schedule *(Time, topic/emphasis & resources)*		
Week	**Lectures**	**Topic**
1	Tue 06/18/2019 Wed 06/19/2019	**Sensor fundamentals** **Sensor fundamentals** **Passive element** **Active elements**
2	Tue 06/25/2019 Wed 06/26/2019	**Noise Analysis** **Sensor Architecture (Voltage, current)** **Sensor Architecture (sinusoidal, impedence)**
3	Tue 07/02/2019 Wed 07/03/2019	**Biosensors** **Biosensors** **Chemical sensors** **Chemical/gas sensors**
4	Tue 07/09/2019 Wed 07/10/2019	**MEMS sensors** **Magnetic sensors** **Image sensors** **Packaging and integration**
5	Tue 07/16/2019 Wed 07/17/2019	Final exam presentations
6	Tue 07/23/2019 Wed 07/24/2019	N/A
7	Tue 07/30/2019 Wed 07/31/2019	N/A
8	Tue 08/06/2019 Wed 08/07/2019	N/A

Note

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