Course Syllabus: Solid State - EE 103

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 103
Course Title	Solid State
Academic Semester	Spring
Academic Year	2018/2019
Semester Start Date	01/27/2019
Semester End Date	05/23/2019
Class Schedule (Days & Time)	04:00 PM - 05:30 PM	Wed Thu

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Talal Al Attar	talal.attar@kaust.edu.sa	+966128080415		TBD

Teaching Assistant(s)

Name	Email
TBD	TBD

Course Information

Comprehensive Course Description	This course covers the physics of microelectronic semiconductor devices for Silicon integrated circuit applications. The main contents are: semiconductor fundamentals, p-n junction, metal-oxide semiconductor structure, metal semiconductor junction, and MOS field-effect transistor. The course emphasizes physical understanding of device operation through energy band diagrams and MOSFET device design. Issues in modern device scaling are also outlined.
Course Description from Program Guide	This course covers the physics of microelectronic semiconductor devices for Silicon integrated circuit applications. The main contents are: semiconductor fundamentals, p-n junction, metal-oxide semiconductor structure, metal semiconductor junction, MOS field-effect transistor, and bipolar junction transistor. The course emphasizes physical understanding of device operation through energy band diagrams and MOSFET device design. Issues in modern device scaling are also outlined. Includes weekly laboratory.
Goals and Objectives	After completing this course, the student should have a firm grasp on: •The physical understanding of device operation of diodes •The physical understanding of device operation of MOS transistors
Required Knowledge	Familiarity with the basic properties of solids
Reference Texts	***Semiconductor Device Fundamentals,*** **Robert F. Pierret**
Method of evaluation	**30.00**% - Final exam **10.00**% - Quiz(zes) **10.00**% - Homework /Assignments **25.00**% - Exam 2 **25.00**% - Exam 1

Nature of the assignments	Homework: Homework assignments are due on Wed in the class. The Solutions will be provided by the end of the day the homework is due. NO LATE homework will be accepted. If you need more time for your homework, you have to inform the Instructor or the TA in advance. Quizzes: There will be at least one Quiz every week (During the class) starting the 2nd week and will be based on a 0-10 point scale. The worst few quizzes will be dropped (If any). If you are keeping up with the problem sets, they should be relatively easy. Exams: There will be two midterm exams and one final exam You are free to use your text book, course notes and any provided figures and handouts
Course Policies	All homework assignments, quizzes, and exams are required. Students who do not show up for a Quiz or an exam should expect a grade of zero on that exam. If you dispute your grade on any homework, quiz, or exam, you may request a re-grade (from the TA for the homeworks and quizzes or from the instructor for the exams) only within 48 hours of receiving the graded exam. Incomplete (I) grade for the course will only be given under extraordinary circumstances such as sickness, and these extraordinary circumstances must be verifiable. The assignment of an (I) requires first an approval of the dean and then a written agreement between the instructor and student specifying the time and manner in which the student will complete the course requirements.
Additional Information	Engineers are required to practice "continuous" or "life-long" learning. This course will cover a lot of material which will require the students to do a lot of self-study, reading of the textbooks and handouts, learning how to use equipment and software, etc…Although the instructor and the TAs are committed to help the students in this course, the students are also expected to take initiatives and to get used to this notion of self-study that will be anyway (i) expected form them in their future careers and (ii) imperative to their success and survival in the real engineering and academic worlds. Please don't hesitate to ask if you have any question or concern about the course.

Week	Lectures	Topic
		Tentative Course Schedule *(Time, topic/emphasis & resources)*
1	Wed 01/30/2019 Thu 01/31/2019	General Introduction
2	Wed 02/06/2019 Thu 02/07/2019	General Material Properties
3	Wed 02/13/2019 Thu 02/14/2019	General Material Properties
4	Wed 02/20/2019 Thu 02/21/2019	Carrier Modeling
5	Wed 02/27/2019 Thu 02/28/2019	Carrier Modeling
6	Wed 03/06/2019 Thu 03/07/2019	Carrier Action
7	Wed 03/13/2019 Thu 03/14/2019	Carrier Action
8	Wed 03/20/2019 Thu 03/21/2019	pn Junction Diodes
9	Wed 03/27/2019 Thu 03/28/2019	Spring Break
10	Wed 04/03/2019 Thu 04/04/2019	pn Junction Diodes
11	Wed 04/10/2019 Thu 04/11/2019	pn Junction Diodes : Electrostatics
12	Wed 04/17/2019 Thu 04/18/2019	pn Junction Diodes :Electrostatics
13	Wed 04/24/2019 Thu 04/25/2019	pn Junction Diodes : I-V Characteristics
14	Wed 05/01/2019 Thu 05/02/2019	pn Junction Diodes : I-V Characteristics
15	Wed 05/08/2019 Thu 05/09/2019	MOS Fundamentals
16	Wed 05/15/2019 Thu 05/16/2019	General Review
17	Wed 05/22/2019 Thu 05/23/2019	Final Exam Week

Note

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