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

Course Syllabus: Semiconductor Optoelectronic Devices - EE 208

Division	Computer, Electrical and Mathematical Sciences & Engineering
Course Number	EE 208
Course Title	Semiconductor Optoelectronic Devices
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	10:30 AM - 12:00 PM | Mon Wed

Instructor(s)

Name	Email	Phone	Office Location	Office Hours
Boon Siew Ooi	boon.ooi@kaust.edu.sa	+966128084350	3218, 3, Ibn Sina (bldg. 3)	Sundays 16:00 - 18:00

Teaching Assistant(s)

Name	Email
Huafan Zhang	huafan.zhang@kaust.edu.sa

Course Information

Comprehensive Course Description

EE208-COURSE SYLLABUS

COURSE NUMBER AND TITLE: EE 208 Semiconductor Optoelectronics Devices
SEMESTER: Fall 2017
MEETING TIMES AND LOCATION:
INSTRUCTOR NAME, CONTACT INFORMATION, OFFICE HOURS: Boon S. Ooi, boon.ooi@kaust.edu.sa,
REQUIRED TEXT (optional)
REFERENCE TEXTS (optional):
"Optical Semiconductor Devices", by Mitsuo Fukuda, ISBN: 978-0-471-14959-0, Wiley

ATTENDANCE POLICY (optional but if you have an attendance policy it should be publicized)
HONOR CODE (optional)
In accordance with the University policy and professional standards, the highest levels of academic integrity are expected in this class. The code of student conduct is strictly enforced. Academic dishonesty will result in reductions in grades and/or expulsions from this class and/or the University.

COURSE DESCRIPTION:
Materials for optoelectronics, optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetime. Principles of LEDs, lasers, photodetectors, modulators and solar cells. Optoelectronic integrated circuits. Designs, demonstrations and projects related to optoelectronic device phenomena**.**

Course Description from Program Guide

Materials for optoelectronics, optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetime. Principles of LEDs, lasers, photodetectors, modulators and solar cells. Optoelectronic integrated circuits. Designs, demonstrations and projects related to optoelectronic device phenomena.

Goals and Objectives

By the end of the course, students are expected to learn the skill of designing and setting up experiments to characterize LEDs, laser diodes, optical amplifiers, photodiodes, solar cells and electro-optics modulators.

Required Knowledge	Good knowledge at optical and electrical properties of semiconductor materials, and fundamental knowledge of diode theory.
Reference Texts	“Optical Semiconductor Devices”, by Mitsuo Fukuda, ISBN: 978-0-471-14959-0, Wiley
Method of evaluation	**60.00**% - Others - Please specify **10.00**% - Homework /Assignments **30.00**% - Final exam
Nature of the assignments	Others: 4 lab modules. 15% per lab report.
Course Policies	Late assignments will not be graded.
Additional Information	N.A.

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 08/26/2019 Wed 08/28/2019	Optoelectronics materials, crystal lattices, and electrical properties of semiconductor
2	Mon 09/02/2019 Wed 09/04/2019	Optical properties and electric field of semiconductor.
3	Mon 09/09/2019 Wed 09/11/2019	p-n junction and heterostrcutures, and low-dimensional structures.
4	Mon 09/16/2019 Wed 09/18/2019	Optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetime
5	Mon 09/23/2019 Wed 09/25/2019	Principles of light emitting diode (LEDs)
6	Mon 09/30/2019 Wed 10/02/2019	Principles of light emitting diode (LEDs)
7	Mon 10/07/2019 Wed 10/09/2019	Principles of laser diodes (LD)
8	Mon 10/14/2019 Wed 10/16/2019	Fabry-Perot Lasers and characteristics of LDs.
9	Mon 10/21/2019 Wed 10/23/2019	Quantum confined active layers: quantum-well (QW), strained QW, and quantum-dot (QD).
10	Mon 10/28/2019 Wed 10/30/2019	Single mode LDs: DFB, and DBR lasers, and VCSELs
11	Mon 11/04/2019 Wed 11/06/2019	Photodiodes (PD): Basic of PDs
12	Mon 11/11/2019 Wed 11/13/2019	Principles of solar cells
13	Mon 11/18/2019 Wed 11/20/2019	PIN PDs and Avalanche PD
14	Mon 11/25/2019 Wed 11/27/2019	Optical modulators: Physical phenomana – Pockels effects, Kerr effect, and Franz-Keldysh effect, Stark, Quantum-confined Stark effects.
15	Mon 12/02/2019 Wed 12/04/2019	Lab I – Laser diode characterizations
16	Mon 12/09/2019	Lab II & III – Optical Amplifiers (SOA, SLD, and DFB laser) characterization

Note

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