



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	2018/2019
Semester Start Date	08/26/2018
Semester End Date	12/11/2018
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
Davide Priante	davide.priante@kaust.edu.sa

Course Information	
Comprehensive Course Description	<p>EE208-COURSE SYLLABUS</p> <p>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</p> <p>ATTENDANCE POLICY (optional but if you have an attendance policy it should be publicized) HONOR CODE (optional)</p> <p>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.</p> <p>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.</p>
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 20.00% - Homework /Assignments 20.00% - Final exam
Nature of the assignments	Others: 4 lab modules.
Course Policies	Late assignments will not be graded.
Additional Information	N.A.

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 08/27/2018 Wed 08/29/2018	Optoelectronics materials, crystal lattices, and electrical properties of semiconductor
2	Mon 09/03/2018 Wed 09/05/2018	Optical properties and electric field of semiconductor.
3	Mon 09/10/2018 Wed 09/12/2018	p-n junction and heterostructures, and low-dimensional structures.
4	Mon 09/17/2018 Wed 09/19/2018	Optical processes in semiconductors, absorption and radiation, transition rates and carrier lifetime
5	Mon 09/24/2018 Wed 09/26/2018	Principles of light emitting diode (LEDs)
6	Mon 10/01/2018 Wed 10/03/2018	Principles of light emitting diode (LEDs)
7	Mon 10/08/2018 Wed 10/10/2018	Principles of laser diodes (LD)
8	Mon 10/15/2018 Wed 10/17/2018	Fabry-Perot Lasers and characteristics of LDs.
9	Mon 10/22/2018 Wed 10/24/2018	Quantum confined active layers: quantum-well (QW), strained QW, and quantum-dot (QD).
10	Mon 10/29/2018 Wed 10/31/2018	Single mode LDs: DFB, and DBR lasers, and VCSELs
11	Mon 11/05/2018 Wed 11/07/2018	Photodiodes (PD): Basic of PDs
12	Mon 11/12/2018 Wed 11/14/2018	Principles of solar cells
13	Mon 11/19/2018 Wed 11/21/2018	PIN PDs and Avalanche PD
14	Mon 11/26/2018 Wed 11/28/2018	Optical modulators: Physical phenomena – Pockels effects, Kerr effect, and Franz-Keldysh effect, Stark, Quantum-confined Stark effects.
15	Mon 12/03/2018 Wed 12/05/2018	Lab I – Laser diode characterizations
16	Mon 12/10/2018	Lab II & III – Optical Amplifiers (SOA, SLD, and DFB laser) characterization
17		Lab III – Photodetector and PV cells characterizations
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Note

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