EUROPEAN UNIVERSITY OF LEFKE

Electrical and Electronics Engineering, Faculty of Engineering

SYLLABUS

2019-2020 Spring Semester

Course Code	Course Name	Course Type	Weekly Course Hours			Credits	ECTS	Weekly Time Schedule
			T	A	L			
EE227/ECE227	Electrical Materials	Major	3	0	0	3	6	Wednesday @ 15:00-17:50; AS111
Prerequisite	PHYS104	Prerequisite to						

Course Lecturer	Soydan Redif	Office Hours Schedule	On instructor's timetable.
E-mail			
Phone		Office / Room No	AS-314
Teaching Assistant		Phone	
E-mail		Office / Room No	

Catalogue Descriptions	Basic semiconductor structure and the atom model (Basic lattice types, Hydrogen atom, Schrodinger's wave equation, etc.), Energy band-gap theory,Basic semiconductor theory (intrinsic carrier concentration, donors acceptors, etc.), Physics of p-n junction diodes (Bipolar junction transistors, field effect transistors). Transistor biasing and small-signal models, Secondary effects in transistors, Dynamic models for diodes and transistors (p-n-p-n switching devices), Semiconductor junctions with metals (Schottky barrier diode, current flow in a Schottky barrier, small-signal equivalent circuit, etc.)
Course Objectives	This course aims to provide an understanding about basic semiconductor operation and semiconductor devices. It starts briefly from quantum mechanics to crystal nature of solids, then it explains the operation of pn junctions, band diagrams and finishes with BJTs, MOSFETS and detector structures.
Learning Outcomes	On successful completion of the course, students should understand: (1) basic quantum mechanics (2) band diagrams for different devices (3) basics of semiconductors and crystal structures (4) pn junction operating principles and solve basic diode circuits (5) BJT and FET operating principles and solve basic transistor circuits.
Textbooks and/or References	1 Dolad A Neamen, Semiconductor Physics and Devices: Basic Principles, 4th Edition, Mc GrawHill, 2011. ISBN 0-07-232107-5
	2 R. Boylestad and L. Nashelsky, Electronic Devices and Circuit Theory, 11th Ed, Prentice-Hall, 2015.

WEEK	Date	TOPICS	Reference No - Section
Week 1	18/02/2020	Introduction. Overview of semiconductors and their use.	1: 1.1-1.8
Week 2	25/02/2020	The atom model, lattice types and structures, bonding	1: 2.1-2.4
Week 3	03/03/2020	Basic semiconductor structure	1: 2.5-2.9
Week 4	10/03/2020	Schrodingers equation	1: 3.1-3.4
Week 5	17/03/2020	Energy band-gap theory (direct semiconductors, holes, thermal equilibrium, etc.)	1: 3.3; 3.5-3.7
Week 6	24/03/2020	Basic semiconductor theory (intrinsic carrier concentration, donors acceptors, etc.),	1: 4.1-4.4;4.6
Week 7	31/03/2020	Physics of p-n junction diodes	1: 5.1-5.4
Week 8	07/04/2020	Ideal and non-ideal diodes models	1: 5.2; 5.5-5.6; 5.9
Week 9	11-18/04/2020	**Midterm Exam Week**	-
Week 10	21/04/2020	Diode circuits	1: 5.2; 5.5-5.6; 5.9
Week 11	28/04/2020	Physics of the bipolar junction transistor (BJT)	1: 6.4-6.6
Week 12	05/05/2020	BJT Basic Circuits	1: 7.1-7.3
Week 13	12/05/2020	Physics of metal-oxide semiconductor (MOS) transistors	1: 7.3; 7.6-7.8
Week 14	19/05/2020	nMOS and pMOS transistor operation and basic circuits	1: 7.3; 7.6-7.8
Week 15	28-07/05-06/2020	**Final Exam Week**	-