FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Electronic Devices

Information :

Course Code :	ELE 420	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electronics & Communication

Instructor Information :

Title	Name	Office hours
Professor	Mohamed Abdelhamid Abualata Ibrahim	18
Assistant Lecturer	Mostafa Mohamed Salaheldin Abdelkhalek	1

Area Of Study :

Improve student's foundational background, theories and mechanism of operation of principle semiconductor devices with emphasis on physical concepts.
Develop the student skills in modeling and characterization of semiconductor devices.
Improve students understanding of the link between device physics and circuit design by introducing design parameters, performance parameters, CAD models, device scaling theory, etc.

Description :

Crystal Structure and Reciprocal Lattice, Energy Bands, Carrier Concentration at Thermal Equilibrium, Generation, Recombination, and Carrier Lifetimes, Carrier Transport Phenomena, Drift, High Field Transport, Impact Ionization, Diffusion Basic Equations and Examples PN Junction and Depletion region I V characteristics, and Non-ideal Effects, PSpice Models for PN Junctions Silicon MOS Capacitor, MOSFET Characteristics and Behavior, MOSFET PSpice model, BJT PSpice model.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Explain mechanisms of principle operation of semiconductor devices.
2 -	Explain physical phenomena and implications of downscaling of semiconductor devices.
3 -	Define compact models for circuit simulation.
b.Intellectual Skills: :	
1 -	Develop analytical models for semiconductor devices.
2 -	Perform compact device models for circuit simulation.
3 -	Manage semiconductor devices for material and process characterization.
c.Professional and Practical Skills: :	
1 -	Build practical circuit simulation using compact device models.
2 -	Use software tools to characterize devices.

d.General and Transferable Skills: :	
1 -	Prepare technical reports.
2 -	Demonstrate ideas and share with others.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Crystal Structure and Reciprocal Lattice	5	3	2
Energy Bands	5	3	2
Carrier Concentration at Thermal Equilibrium ,	5	3	2
Generation, Recombination, and Carrier Lifetimes	5	3	2
Carrier Transport Phenomena, Drift, High Field Transport, Impact Ionization, Diffusion	10	6	4
PN Junction and Depletion region I V characteristics	15	9	6
Silicon MOS Capacitor	15	9	6
MOSFET Characteristics and Behavior,	10	6	4
MOSFET Pspice model	5	3	2

Teaching And Learning Methodologies :

Interactive Lecture
Discussion
Problem Solving
Experimental Learning
Research/ Project

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment/Project	15.00		
Final Exam	40.00		
Lab	5.00		
Mid Term I	15.00		
Mid Term II	15.00		
Quizzes	10.00		

Course Notes :

-Taken by the student inside classroom

Recommended books :

-R.F. Pierret. ñSemiconductor Device Fundamentalsò, Prentice-Hall, 2nd Ed., 1996.

Periodicals :