Faculty of Engineering & Technology

Microsystems Technology

Information :

Course Code :	ELE 524	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electronics & Communication

Area Of Study :

Introduce advanced semiconductor devices
Develop a detailed understanding of the fabrication technology of semiconductor electronic, optoelectronic devices and microelectromechanical devices.
Introducing the design parameters, performance parameters and CAD models, etc.

Description :

Physical principles, Design, and micro fabrication technologies pertinent to input (sensor) and output (actuator) devices for multimedia applications such as document and video imaging devices, Micro mirror projection displays and micro-electro-mechanical systems.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe the basic operation of advanced semiconductor, optical devices and MEMS and their characteristics.
2 -	Define design features that determine the device characteristics.
3 -	Define the device models for circuit simulation.
b.Intellectual Skills: :	
1 -	Develop analytical models for the advanced semiconductor, optical devices and MEMS.
2 -	Use device models for circuit simulation
3 -	Use semiconductor, optical devices and MEMS for material and process characterization.
4 -	Examine a detailed understanding of the many and diverse aspects that relate to the operation and exploitation of semiconductor devices.
c.Professional and Practical Skills: :	
1 -	- Develop a practical circuit simulation using compact device models
2 -	Develop technical report writing skills
3 -	Design, model and analyze a number of semiconductor advanced semiconductor, optical devices and MEMS types.
d.General and Transferable Skills: :	
1 -	d1- Communicate effectively.
2 -	d2- Demonstrate Efficient IT capabilities using modern software tools

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to Microsystems, Microfabrication	5	3	2
Microfabrication ï Cleaning, Oxidation, Doping, bonding	5	3	2
Microfabrication ï lithography, Process development	5	3	2
Review basic mechanical concepts, pressure sensor	5	3	2
Piezoresistance, Piezoelectricity	5	3	2
Radiation sensing ï theory, Optical sensors ï photodiodes	10	6	4
Optical ï CCDs, LED, LCD	15	9	6
High energy radiation detectors, Biochemical sensing, Hall effect	10	6	4
GMR read/write heads	5	3	2
Noise ï characteristics of random noise, sources and analysis	10	6	4

Teaching And Learning Methodologies :

- Interactive Lecturing
- Problem Solving
- Discussion
- Experiential Learning

Course Assessment :

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

Course Notes :

Taken by the student inside classroom

Recommended books :

- Microsystem Design, Stephen Senturia, Springer, 2001.
- Device Electronics for Integrated Circuits. 3rd Ed, R. Muller R. Kamins and M. Chan, Wiley, 2002.
- Foundation of MEMS, Chang Liu, 2nd Ed., Prentice Hall, 2011.

Periodicals :

- IEEE periodicals, Nanohub.org