

**Faculty of Engineering & Technology**

**Basic Electronic Circuits**

**Information :**

**Course Code :** ELE 216

**Level :** Undergraduate

**Course Hours :** 3.00- Hours

**Department :** Department of Mechanical Engineering

**Instructor Information :**

Title	Name	Office hours
Professor	Saeed Hassan Ibrahim Saeed	4
Teaching Assistant	Donia Waheed Mohamed Abdelmonem Saleem	

**Area Of Study :**

By the end of this course, students will be able to:

- 1- Characterize Semiconductor Materials;
- 2- Analyze the Conduction Mechanism in Semiconductors;
- 3- Give the Structure, Analyze, and Characterize Diodes;
- 4- Give the Structure, Analyze, and Characterize BJT;
- 5- Give the Structure, Analyze, and Characterize MOSFET;

**Description :**

Semiconductor devices and switching characteristics, Logic gates and families, Memory elements and types, Timing circuits, Analog / digital and digital / analog converters.

**Course outcomes :**

**a. Knowledge and Understanding :**

1 -	Understand the atomic structure and the energy band diagram of semiconductor materials.
2 -	Understand the conduction mechanisms in semiconductors.
3 -	Know and Classify different diode structures.
4 -	Know and Classify different BJT structures.
5 -	Know and Classify different FET structures.
6 -	Enumerate built-in potential, transition region capacitance, and diffusion capacitance of the PN junction.
7 -	Derive the PN junction I-V characteristics.
8 -	Implement clipping and rectifier circuits
9 -	Derive the BJT input and output characteristics.
10 -	Understand the use of BJT to amplify signals and its use as a switch
11 -	Derive the FET input and output characteristics.
12 -	Understand the Operational Amplifier Characteristics and applications

**b. Intellectual Skills :**

1 -	Compare between different kinds of diodes.
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2 -	Compare between different kinds of transistors.
3 -	Analyze Diode circuits (clipper, rectifier,..etc).
4 -	Analyze BJT biasing circuits
5 -	Analyze MOSFET biasing circuits
<b>c. Professional and Practical Skills: :</b>	
1 -	Measure the diode I-V characteristics.
2 -	Measure the BJT input and output characteristics
3 -	Measure the FET input and output characteristics
<b>d. General and Transferable Skills: :</b>	
1 -	Work effectively in team.
2 -	Develop skills related to creative thinking, problem solving, oral and written communication, and teamwork

**Course Topic And Contents :**

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction to Semiconductor Solid State	8	4	4
Semiconductor Diode	8	4	4
Diode Models	8	4	4
Diode Circuit Applications	8	4	4
Bipolar Junction Transistor (BJT)	8	4	4
Metal Oxide Semiconductor Field Effect Transistor (MOSFET)	8	4	4
Operational Amplifier	12	6	6

**Teaching And Learning Methodologies :**

Interactive Lecturing
Problem solving
Experiential learning

**Course Assessment :**

Methods of assessment	Relative weight %	Week No	Assess What
1st Midterm	15.00	5	
2nd Midterm	15.00	10	
Assignments, Participation, & Quizzes	30.00		
Final Exam	40.00	16	

**Recommended books :**

Electronic Principles (7th edition or later), A. Malvino and D. Bates,, ISBN-10: 0073222771Lecture notes on the course Moodle page, FUE website.  
Microelectronic Circuits, (5th edition), A. Sedra and J. Smith, Oxford University Press, ISBN-10: 0195338839, 2004.  
Instructor notes