

**Course description:**

Characteristics of semiconductor materials. P-N junction. Diode: Forward and reverse biasing. Diode circuits analysis. Basic diode applications. BJT and MOSFET transistors (DC, small signal analysis).

Aims of the course:

- Gain knowledge about the operation and the structure of several electronic devices, such as: diodes and transistors.
- Design and analyze various rectifier circuits.
- Design and analyze several types of amplifier circuits.
- An introduction to the Operational Amplifiers.

Intended Learning Outcomes (ILOs):

- 1) Understanding in the fundamental electric and electronics principles.
- 2) Understand the properties of electronics components in electric circuits
- 3) Solve basic problems in electric and electronic circuits.
- 4) Understand the operations of transistor devices, e.g., BJT and MOSFET
- 5) Analyze the small-signal characteristics of transistor amplifiers
- 6) Design basic analog building blocks

Course structures:

Week	C. Hrs	ILOs	Topics	Teaching Procedure	Assessment methods
Week 1-3	9	1,2,3	Semiconductor Diode Circuit Analysis: Semiconductor Diodes, Rectification , Zener Diodes ,Clipper and Clampers.	Whiteboard	Homework – 1
Week 4-7	9	3,4	Bipolar Junction Transistors (BJT) : Transistor Models, Bipolar Transistor Biasing ,Common Emitter Amplifier (CE), Common Collector Amplifier (CC) and Common Base Amplifier (CB).	Whiteboard	Homework – 2 Quiz - 1
Week 8-10	9	3,4,5	Design of Bipolar Junction Transistor Amplifier (CE,CC,CB): Input Resistance, Current Gain, Voltage Gain and Output Resistance.	Whiteboard	Homework – 3 Quiz - 2

Week 11-12	6	3,4,5	Field Effect Transistors (FET): Types of FETs JFET operation and Construction, MOSFET Operation and Construction	Whiteboard	Homework – 4 Quiz - 3
Week 13-16	9	3,4,5	Field Effect Transistor (FET) Amplifier: Biasing of FETs ,Analysis and Design of Common Source (CS) and Common Drain (CD) Amplifiers	Whiteboard	Homework – 5 Quiz - 4

References:

- 1- R. Boylestad, (2002), “**Electronic Devices and Circuit Theory**”, 8th edition, Prentice Hall
- 2- Donald A. Neamen, (2001), “**Electronic Circuit Analysis and Design**”, 2nd edition, McGraw-Hill
- 3- J. Millman, (1990),”**Microelectronics**” McGraw-Hill, 1990
- 4- T.L. Floyd, (1991), “**Electronic Fundamentals**”, Maxwell Macmillan
- 5- Sedra/Smith, (2004), “**Microelectronic Circuits**”, 5th edition, Oxford University Press.
- 6- C. J. Savant, Martin S. Roden and Gordon L. Carpenter, (1990), “**ELECTRONIC DESIGN, CIRCUITS AND SYSTEMS**”, 1st edition, Benjamin-Cummings

Assessment Methods:

Methods	Grade	Date
Reports, Homeworks and/or Projects	10	
First Exam	20	12/4/2017
Second Exam	20	
Final Exam	50	

