Course Description

Module*	Language*
Physical Electronics	English
Academic Year	**Semester:**
2024-2025	Spring
ECTS:	**Prerequisite:**
5	-
Course Outcome	

1. **Understand and Classified materials**
   Students will be able to classify the materials in different classes based on their physical, and electrical properties

2. **Understand and analyze properties of materials**
   Understand the properties of materials that lead to be useful for the construction of electronic circuits such as silicon germanium, giving reasons; and explain the uses of these material

3. **Understand semiconductors materials**
   Student will be able to explain the different carriers and transport phenomenon in semiconductors and understand the meaning of intrinsic and extrinsic semiconductor as well as doping

4. **Identify and Differentiate types of semiconductor diodes**
   Students will be able to identify the types of semiconductor diodes such as PN junction, Schottky barrier diode, LED, Photodetector, Zener diode The Varactor Diode and The Tunnel Diode and understand their physical structure, properties and its operation.

5. **Understand and analyze diode characteristics**
   Students will be able to analyze the Diode - Static and Dynamic resistances, Equivalent circuit, diode equation and Diffusion and Transition Capacitances

6. **Apply diode in electronics circuit**
   Students will be able to appreciate the importance of diode applications: Half-wave rectifier, Full-wave rectifier, Clipper, Clamper and Voltage multiplier.

7. **Understand BJT transistor**
   Students will be able to understand BJT as Structure, Operation, Characteristics, Parameters, Biasing and Configuration.

Course Content: *

Representation of intrinsic and extrinsic properties of semiconductors: N-type, P-type. Overview to diode operation and diode model parameter extraction. Types of semiconductor diodes: PN junction, Schottky barrier diode, LED, Photodetector, Zener diode, The Varactor Diode and The Tunnel Diode. Diode circuits: half and full-wave rectifiers, clamper, clipper and voltage multiplier. Description of BJT (Structure, Operation, Characteristics, Parameters, Biasing and Configuration)

References: *

- Thomas L. Floyd, "ELECTRONIC DEVICES", Tenth Edition, Pearson, 2018.
- Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuit Theory", Eleventh Edition, Pearson, 2013.
- V. K. Mehta and Rohit Mehta, "Principles of Electronics", Eleventh Edition, S. CHAND, 2008.

Type of Teaching: *

3 hours /Theoretical

Requirements For Credit Points: *

Modules Course Requirements:
1. Students Attendance in class is important.
2. Discussion in class is required
3. H.W and assignments
4. Midterm exam
5. Quiz
6. Site Visit

Grade Distribution: *

The Grade Requirements
%40 Student Efforts
60% Final Exam

Weekly Plan

Module*	
Physical Electronics	

Academic Year	Semester:
2024-2025	Spring

ECTS:	Prerequisite:
5	-

Detail

Week	Detail
1	Atomic Structure of Elements and Materials used in Electronics
2	Current in Semiconductors and N-type and P-type Semiconductors
3	PN Junction diode and Diode Operation, Voltage-Current (V-I) Characteristic of the Diode
4	Diode Models and examples
5	Special-Purpose Diodes (Schottky barrier diode, LED)
6	Special-Purpose Diodes (Photodetector, Zener diode, The Varactor Diode and The Tunnel Diode)
7	**Diode Applications** (Rectifiers and filters)
8	**Mid-Term Exam**
9	**Diode Applications** (Clippers, Clampers)
10	**Diode Applications** (Clampers and Voltage Multiplier)
11	Bipolar Junction Transistors (BJT Construction and BJT Operation)
12	Bipolar Junction Transistors (common base, common Emitter and Common Collector)
13	BJT Biasing and Configuration (Fixed bias and voltage divider bias)
14	Discussion

Workload

			Module*
			Physical Electronics
	Academic Year		**Semester:**
	2024-2025		Spring semester
	ECTS:		**Total number of credit hour**
	5		5*27 = **135**
			Prerequisite:
			-
			Detail
Type	**Number**	**Time Factor**	**Total**
Attendance	14	3hr	14 *3 = 42
Mid Term Exam	2	3hr	2*3=6
assignments	3	3hr	3*3=12
Class work	8	3hr	8*3 = 24
Discussion	8	3hr	8*3=24
Quiz	3	1hr	3*1=3
Site visit	6	3hr	6*3=18
Seminar	1	3hr	1*3=3
Project	1	3hr	1*3=3
			135