

## **EC332- Electronic Devices (2)**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2; Lab: 2

### **COURSE COORDINATOR**

Dr. Khaled Shehata

### **TEXT BOOK**

Sedra-Smith, Microelectronic Circuits, Oxford Pub., 6<sup>th</sup> ed, 2004.

### **COURSE DESCRIPTION**

Operation of BJT - DC Analysis - BJT Base Width Modulation - AC Analysis of BJT - Common Emitter, Collector, and Base Amplifiers - BJT as a Switch - Operation of JFET - DC and AC Analysis - MOS-Structure - Operation of MOSFET - Depletion/Enhancement Mode MOSFETs - DC Analysis of MOSFET - Channel Length Modulation - Body Effect - MOSFET Capacitances - AC Analysis of MOSFET - Common Source, Drain, and Gate Amplifiers - MOSFETs Amplifiers using Active Loads - Shockley, Diac, SCR, Triac, UJT, and PUT Circuits

### **PREREQUISITE:**

EE 232, EC 233

### **RELATION OF COURSE TO PROGRAM**

Required

### **COURSE INSTRUCTION OUTCOMES**

The student will be able to:

Study theoretically and experimentally both transistor types:

- BJT: Bipolar junction transistor.
- FET: Field effect transistor.

Study theoretically the 4 layer devices (Thyristors).

### **TOPICS COVERED**

- Operation of BJT
- Biasing Methods
- Biasing Methods Cont'd – BJT Base Width Modulation
- AC Equivalent Circuits of BJT
- Common Emitter, Collector, and Base Amplifiers
- BJT as a Switch
- Operation of JFET – DC and AC Analysis
- MOS-Structure, Operation of MOSFET

- Depletion/Enhancement Mode MOSFETs, DC Analysis of MOSFET
- Channel Length Modulation, Body Effect, and MOSFET Capacitances
- AC Equivalent Circuits of MOSFET
- Common Source, Drain, and Gate Amplifiers
- MOSFETs Amplifiers using Active Loads
- Schockley, Diac, SCR, Triac Circuits
- UJT and PUT Circuits

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Other</b>
	✓		

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course aspects</b>
A	An ability to apply knowledge of mathematics, science, and engineering	
B	An ability to design and conduct experiments, analyze and interpret data.	b <sub>1</sub> b <sub>2</sub> b <sub>3</sub> b <sub>4</sub>
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	
D	An ability to function on multi-disciplinary teams.	d <sub>1</sub> d <sub>2</sub> d <sub>3</sub> d <sub>4</sub>
E	An ability to identify, formulate, and solve engineering problems	
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	g <sub>1</sub> g <sub>2</sub> g <sub>3</sub>
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	