Course Number: **EE 203**

Course Title: Electronics 1 (Required Course)

Course Description :

Operational Amplifiers. Semiconductor Physics. PN junction. Diode applications. BJT and MOSFET physics and I-V characteristics. DC basing. Analog electronics applications (BJT and MOSFET small signal amplifiers). Digital Electronics applications CMOS logic gate analysis and design. Comparison with TTL, ECL, and BiCMOS.

Prerequisites :

Electrical Circuit I (EE 202)

Textbook :

Sedra and Smith, "*Microelectronic Circuit,*" 5th Edition, 2004, Oxford University Press, ISBN 0-19-514252-7.

Other useful references and material :

Richard Jaeger, and Travis Blalock, *Microelectronic Circuit Design*, 2nd Ed., McGraw Hill Education, 2004. ISBN 0072320990

Website: http://webcourses.kfupm.edu.sa/SCRIPT/EE203001/scripts/serve_home

Course objectives :

- Understand the operation of the op-amps.
- Analyze and design different circuits using ideal op-amps.
- Identify and characterize different semiconductor devices (P-N Junction, BJT, MOSFET, and JFET).
- Understand different diode and transistor applications (clipping, clamping, amplifier, digital gates ...).
- Analyze and design different electronic circuits contain semiconductor devices using devices' models.
- Identify the design parameters and different characteristics of small signal amplifiers.
- Understand different digital families and get the required knowledge to select the proper family for a certain application.

Topics Covered:

- Basic Operational amplifiers and applications
- PN junction (Diode) physics and I/V Characteristics
- Diode models and circuit analysis

- Diode applications (Rectifier, Limiters, Clampers, Power Supply)
- MOSFET structure and physical operation
- MOSFET I/V Characteristics and different operating regions.
- MOSFET DC analysis
- MOSFET as an amplifier and small signal analysis
- BJT structure and physical operation
- BJT I/V Characteristics and different operating regions.
- BJT DC analysis
- BJT as an amplifier and small signal analysis
- Digital circuits performance characteristics
- CMOS Inverter
- CMOS circuits design
- Comparison with TTL and ECL families

Class Schedule:

3 lectures per week, 50 minutes each and 3 hours lab per week.

Contribution of course to meeting the professional component:

This course provides the engineering science foundation in the area of electronics. It incorporates a combination of college level mathematics appropriate to electronic circuit analysis and design. Also, it extends basic sciences (Physics) to study the physical operation of the semiconductor devices. In addition, the course emphasizes the use of computer analysis tools such as PSPICE. Laboratory experiments are designed to promote the spirit of team work.

Course Outcomes :

1. An ability to apply knowledge of mathematics, science, and engineering to the analysis of electronic circuits**.**
2. An ability to apply knowledge of mathematics, science, and engineering to the design of electronic circuits
3. An ability to identify, formulates, and solves basic electronic engineering problems.
4. An ability to use the techniques, skills, and modern engineering tools such as PSPICE to analysis and design electronic circuits**.**
5. An ability to conduct experiments, as well as to analyze and interpret data

Course Outcomes to Program Outcome Mapping:

Course Outcome	Program Outcome												
	a	b	c	d	e	f	G	h	i	j	k	l	m
1	X												
2			X										
3					X								
4			X								X		
5		X											