

ECE 25500 – Introduction to Electronic Analysis and Design

Type of Course

Required for CmpE and EE Programs

Catalog Description

Diode, bipolar transistor, and FET circuit models for the design and analysis of electronic circuits. Single and multistage analysis and design; introduction to digital circuits. Computer-aided design calculations, amplifier operating point design, and frequency response of single and multistage amplifiers. High-frequency and low-frequency designs are emphasized.

Credits

3

Contact Hours

3

Prerequisite Courses

ECE 20100, and CHM11500

Prerequisites by Topics

Basic circuit analysis including Ohm's and Kirchhoff's Laws, loop and nodal analysis, Thevenin and Norton equivalents, Sinusoidal forcing functions, phasors, impedance, and admittance

Textbook

Donald A. Neamen, Microelectronics Circuit Analysis and Design, McGraw Hill, 4th Edition.

Course Objectives

One objective of this course is to use the material presented in the introductory courses in an engineering sense, i.e., design. The medium used is the analysis and design of electronic systems. A secondary objective is the use of the computer in this process, i.e., when, if, and how the computer should be used to solve an engineering design problem. A third objective is that of introducing specific electronic systems as design examples of a complete engineering problem using systems specifications and typical specification sheets as a starting point.

Course Outcomes

Students who successfully complete this course will have demonstrated

1. An ability to design the components of a power supply, including rectification, filtering, and voltage regulation to produce a desired output. (2)
2. An ability to analyze and interpret the dc and ac characteristics of circuits containing BJTs or MOSFETs, and to distinguish the application of the device as a switch or an amplifier (6)
3. An ability to analyze and design operation amplifiers and to use them for amplification in electronic circuits. (1)

Table 1. Mapping between course outcomes to program student learning outcomes

Course outcome\ABET SLOs	1	2	3	4	5	6	7
1		x					
2						x	
3	x						
Assessment Level*	M	M				M	

* H: Outcome assessed with high degree;

M: Outcome assessed with medium degree;

L: Outcome assessed with low degree

Lecture Topics

1. Review of Linear Circuit Theory
2. Diodes, diode models, diode applications
3. MOSFETs, MOSFET circuits, MOS logic
4. Bipolar Junction Transistors, BJT circuits
5. Transistor applications, Multi-stage circuits
6. BJT amplifiers, BJT hybrid-pi model
7. MOSFET amplifiers, MOSFET hybrid-pi model
8. Differential amplifiers
9. Frequency response

Computer Usage

Medium

Laboratory Experience

None

Design Experience

Medium

Coordinator

Elizabeth A. Thompson, Ph.D.

Date

10/10/2022