EE 431 - Electronic Circuits

1997-1999 Catalog Data

EE 431-3. Electronic Circuits. Theory and application of basic engineering electronics developed for discrete and integrated circuits. Topics include bipolar and field effect transistor amplifier analysis and design including frequency response, multistage and feedback amplifier design. Prerequisites: EE 321, EE 331 and EE 332; Corequisites: EE 303, EE 304 and EE 432.

Textbook

Sedra & Smith, *Microelectronic Circuits*, 4th ed., Oxford University Press, 1997

Coordinator

M. K. Kazimierczuk, Professor of Electrical Engineering

Goals

To provide each student with an understanding of semiconductor electronic devices operating in multistage circuits. It is intended to emphasize to the student the design techniques which are applicable to a variety of practical electronic circuits. In addition, this course should form a basis for further, more specialized study in electronics.

Topical Prerequisites

Each student should:

- be familiar with fundamental concepts of amplifiers
- be able to analyze amplifiers for the dc component
- be familiar with low-frequency small-signal models of MOSFETs and BJTs
- be able to perform small-signal analysis MOSFET and BJT amplifiers for midfre-quencies
- understand basic characteristics of amplifiers with different configurations
- understand fundamental differences between MOSFET and BJT amplifiers
- be able to design amplifiers for mid-frequencies
- understand basic techniques of evaluating the dynamic performance of linear circuits
- be familiar with s-domain analysis
- be familiar with the concept of the transfer function
- be familiar with Bode plots of circuits with simple poles and zeros
- be familiar with transient response of first-order circuits

Learning Objectives

For each student to:

- be able to model, analyze and design amplifiers for low frequencies
- be able to model, analyze and design amplifiers for high frequencies
- be familiar with a dominant pole concept
- be familiar with approximate techniques of finding poles and zeros
- understand the concept of the bandwidth and unity gain frequency of amplifiers
- understand the principle of operation of power amplifiers
- understand basic performance parameters of power amplifiers
- be familiar with fundamentals of heat transfer and cooling of electric devices
- learn basic topologies of negative feedback

- understand the effect of negative feedback on amplifier sensitivity, gain, input and output impedance, and frequency and transient responses
- be able to analyze, and design amplifiers with negative feedback

Laboratory

EE 432 (one credit), Electronic Circuits Laboratory, is a separately listed laboratory course that complements this EE 431 lecture course.

Computer Usage

None.

Estimated ABET Category Content

Engineering Science	1 credit hour or 33%
Engineering Design	2 credit hours or 67%