

EE 326 Microelectronic Circuits II

Credits: 3

Categorization of credits: engineering topic

Instructors or course coordinator: Jeffrey Weldon

Textbook and Other Required Materials:

Sedra, Adel S., and Kenneth C. Smith. *Microelectronic Circuits Revised Edition*. Oxford University Press, Inc., 2007.

Designation: Elective (required for EP track students)

Catalog Description: EE 326 Microelectronic Circuits II (3) Principles and design of linear electronic circuits including differential, operational, feedback, and tuned amplifiers; integrated circuits, current mirrors, signal generators, filters, and stability. Pre: 323.

Pre-and Co-requisites: Pre: EE 323 (Microelectronic Circuits I).

Class/Lab Schedule: Three 50-minute lectures per week

Topics Covered:

- Amplifier topologies including CS, CD, and CG topologies
- Single-stage, multistage and differential and multistage amplifiers using MOS devices
- Current mirrors: Basic, steering and cascode. Input / output resistance, gain, transimpedance amplification
- Frequency response of amplifiers: Open- and short-circuit techniques, time constants, Bode plots and techniques for rapid assessment of amplitude and phase
- Feedback: Topology, characteristics, stability and frequency compensation
- Analog Integrated Circuits: analysis of op amp integrated circuits and applications, gain, slew rate and common-mode rejection
- Digital logic: Pull-up networks, pull-down networks, topology of NOT/AND/OR/ etc... logic circuits

Course Objectives and Their Relationship to Program Objectives:

A student should understand (i) principles of operation of linear electronic circuits, (ii) the principles of analog circuit design, and (iii) develop skills for building, measuring, and evaluating circuit performance. In addition, a student should master modern design methods for analog circuits, including appropriate computer-aided design (CAD) tools. [Program Objectives this course addresses: 1, 2, and 4.]

Course Outcomes and Their Relationship to Program Outcomes:

The following are the course outcomes and the subset of Program Outcomes (numbered 1-7 in square braces "[]") they address:

- Understand principles of operation MOSFET single-stage, multistage and differential IC amplifiers. [1, 2]
- Understand principle of operation and applications of basic IC current sources and mirrors. [1, 2]
- Characterize amplifier frequency response. [1, 2, 4]
- Analyze feedback effect on amplifier performance. [1, 2, 4]
- Understand and evaluate op amp performance. [1, 2, 4]
- Understand and evaluate digital logic circuits. [1, 2, 4]

Contribution of Course to Meeting the Professional Component

Engineering Topics: 100%

Computer Usage:

Students use Microsoft Excel for processing of data and presentation of charts and graphs, Pspice for simulation, and MATLAB for computing. The course also makes use of Internet services such as email for Q&A and the web for references, and web-based tutorials.

Person Preparing Syllabus and Date: D. Garmire, 2014. Modified by A. Ohta, Jan. 12, 2021.
Modified by J. Weldon, April 11, 2021.