Electrical Engineering 741
Analog Integrated Circuits

Instructor: Dr. C.H. Chen

Texts: "Analog Integrated Circuit Design", D. A. Johns and K. Martin, John Wiley & Sons, Inc., New York, TK7874.J65 (1997).

Course Description: This course provides a fundamental and in-depth knowledge of the analysis, modeling and design of analog integrated circuits in CMOS and BJT technologies. The topics include transistor models for DC, small-signal and noise analysis, device processing and layout, biasing, small-signal analysis, and design examples of amplifiers and oscillators. A good understanding of semiconductor theory and modeling, circuit analysis, and CAD tools (e.g. SPICE or Spectre) is required.

Course Outline:

1. Review of semiconductor devices and modeling
2. Device processing and layout
3. Noise analysis and modeling in devices and integrated circuits
4. Biasing, current sources, active loads, voltage sources and bandgap references
5. Analysis of single-stage and differential amplifiers
6. Analysis and design of operational amplifiers
7. Feedback
8. Frequency response and frequency compensation
9. Stability and oscillators

Grading:
Assignments - 30%
Midterm exam - 15%
Final exam - 25%
Project - 30%

Project: Projects could be the design and detailed analysis, modeling and simulation (or a combination of these) of an analog integrated circuit for a specific purpose/application. Several examples of possible projects will be discussed at the beginning of classes.

References:

1. P. E. Allen and D. R. Holberg, "CMOS Analog Circuit Design", 2nd ed., Oxford, 2002.
2. B. Razavi, "Design of Analog CMOS Integrated Circuits", McGraw-Hill, 2001.
3. P. R. Gray, "Analysis and Design of Analog Integrated Circuits",4th ed., John Wiley & Sons, Inc., New York, 2001.
4. M. J. Jacob, "Applications and Design with Analog Integrated Circuits", Prentice-Hall, New Jersey, 1993.
5. A. B. Grebene, "Bipolar and MOS Analog Integrated Circuit Design", Wiley, New York, 1984.
6. A. B. Grebene, "Analog Integrated Circuit Design", Van Nostrand Reinhold, New York, 1972.

Term: II