CND 301: Advanced Analog Design

Course Description

The main objective of this course is to introduce the students to analog signal processing blocks with an emphasis on underlying concepts from circuit and system analysis and "hands-on" IC design using industrial CAD tools.

Prerequisites

Introduction to Analog Electronics

Learning Outcomes

After successful completion of this course, the student will be able to:
1. Explain the signal processing techniques implemented by the analog electronic circuits.
2. Design and evaluate different types of analog filters.
3. Evaluate the performance of opamp-based circuits with their applications in communication systems.
4. Design power supply circuits.
5. Use advanced CAD tools to design and simulate analog electronic circuits.

Course Materials

Textbook:
- Adel S. Sedra, Kenneth C. Smith, Tony Chan Carusone, Vincent Gaudet, Microelectronic Circuits, 8th Edition, Oxford University Press.
- Sergio Franco, Design with Operational Amplifiers and Analog Integrated Circuits. 4th Ed, McGraw-Hill Education.
- Richard Jaeger, Travis Blalock, Microelectronic Circuit Design, 4th Edition, McGraw-Hill Education.
  References:
- Material is also derived from the IEEE Journal, Transactions, and the International Solid-state Circuits Conference (ISSCC) proceedings.

Course Topics and Schedule
- Introduction to operational amplifiers
- Op-amp frequency response
- Basic op-amp circuits
    - Comparators
    - Summing amplifiers
    - Integrators
    - Differentiators
- Active op-amp filters
- Oscillators and timers
- Power supplies
- Special amplifiers
    - Instrumentation amplifiers
    - Isolation amplifiers
    - Operational transconductance
    - Amplifiers (OTAs)
    - Log/antilog amplifiers
- Various types of transducers and associated measurement circuits