Course: EE 412 ELECTRONIC INSTRUMENTATION DESIGN

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Prerequisites: EE316- Electronics 2 or equivalent or consent of the instructor.

Text: Design with Operational Amplifiers and Analog Integrated Circuits,

Other References: Microelectronic Circuits, Sedra/Smith

Cadence P-spice will be used in class designs.

Grading:
Homework ...................................................................25%
Midterm 1 ....................................................................25%
Lab work ......................................................................25%
Final Examination ........................................................25%

Class Objectives
To produce graduates with the ability to design the analog circuits utilized in
electronic instrumentation.

Course Outcomes
At the conclusion of EE 412, students will:
  • Be able to describe and model different electrical transducers
  • Design an optimum amplifier for a transducer
  • Design signal conditioning circuits for limiting, filtering, and waveform shaping
  • Specify the performance required from A/D and D/A converters in a design.
Class Outline (subject to change)

- Course introduction
- Operational amplifiers
  - Specifications, evaluation
  - Limitations – offset voltage and current, drift, noise, large and small signal response, distortion
  - Power supply and physical layout considerations
  - Linear Circuits- Transfer functions, integrators, differentiators, transimpedance amplifiers
  - Nonlinear Circuits- Limiters, Clampers, Wave shaping, Log amplifiers
- Filtering – practical lowpass, bandpass, bandreject, hi-pass active filter designs
  - 2^{nd} and 3^{rd} order active filters
  - Implementation of higher order filters- method of coefficients
- Noise in amplifiers
  - Estimation
  - Effects on measurement accuracy
- Transducers – models and characteristics
- A/D and D/A – specifications, characteristics, implementation
- Time permitting – Oscillators, Phase-Lock-Loops, Modulation