Electronics Laboratory

ECE 3027

Credit Hours:
1.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lab

Course Description:
Electronic amplification, signal processing, timing, and power regulation circuits. Experiments with electronics evaluation modules and use of an analog system lab kit for electronics testing.

Prerequisites and Co-requisites:
Prereq: 3020; and ECE or EngPhysics major.

Course Goals / Objectives:
- Use knowledge of circuits and electronics to design electronic circuits, and to measure and document performance of electronic circuits
- Provide the student the experience of designing, constructing, testing, and debugging electronic circuits
Course Topics:
- Overview of the TI Analog System Lab Kit Pro and lab procedures. Op Amp Circuits - verify correct operation by reducing offset voltage with unity gain configuration, and use this to estimate open loop gain.
- Op Amp Circuits: Inverting and non-inverting configurations.
- Op amp based Schmitt trigger, oscillators, and monostable multivibrator. Dual supply vs. single supply designs. Oscillator driving light emitting diode circuits.
- Op amp integrators and differentiators - dual vs. single supply. Slew rate effects, settling time, and ringing behaviors.
- Transistor amplifiers and inverters - single supply vs dual supply designs. N type vs P type transistor amplifier configurations.
- Op amps combined with transistor buffer amplifiers for driving higher current loads such as light emission, sound, and other power considerations, such as regulation.
- Measurements of TI Analog System Lab Kit's built-in low dropout regulator and DC-DC switching regulator.
- Discrete low dropout regulator design and measurement. Op Amp selection with respect to stability and settling time.
- Discrete form of switching regulator - LCR plus transistor switch.
- Analog multipliers vs. multiplying Digital to Analog Converters (DAC). Programmable oscillator with analog multiplier vs. DAC.
- Programmable filter with analog multiplier vs DAC. Controlling DAC with TI Launchpad Microcontroller.
- Analog to Digital Converter in TI Launchpad Microcontroller.

Designation:
Required