THE OHIO STATE UNIVERSITY

COLLEGE OF ENGINEERING

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