THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Electrical Circuits and Electronic Devices

ECE 2300

Credit Hours:
3.00

Course Levels:
Undergraduate (1000-5000 level)

Course Components:
Lecture
Lab

Course Description:
Introduction to circuit analysis; circuit analysis concepts and mechanical systems analogies; theory and applications of electronic devices; operational amplifiers; electrical instruments and measurements.

Prerequisites and Co-requisites:
Prereq: Physics 1251 or 1261, and Math 1172 or 1544 or 2153 or 2162.01 or 2162.02 or 2182H or 4182H, and CPHR 2.0 or above, and enrollment in College of Engineering.

Course Goals / Objectives:
- Master the basic laws of circuit theory
- Be competent to analyze simple resistive or dc circuits
- Be competent in the analysis of steady-state RC and RL circuits, including frequency domain concepts and filters
- Be competent in the transient analysis of RC and RL circuits
- Be familiar with the fundamentals of AC power circuits, including the distinction between three-phase and residential power wiring and distribution
- Be competent in the analysis of basic ideal and non-ideal operational amplifier circuits
- Be familiar with diodes and their application in rectifiers
- Be familiar with the basics of electronic instrumentation and measurements

Course Topics:

- Fundamentals of electric circuits: Kirchhoff’s current & voltage laws, power & sign conventions, Ohm’s law, practical sources & measuring devices
- Resistive network analysis: node voltage analysis,mesh current analysis, superposition & Thevenin equivalent, loading
- AC network analysis: capacitors and inductors, sinusoids and sinusoidal response; phasor analysis of sinusoidal circuits
- Transient analysis with emphasis on 1st order circuits and brief overview of 2nd order circuits
- Sinusoidal frequency response of RLC circuits, filter circuits
- Power in AC circuits, complex power, transformers, three-phase power, residential wiring & power distribution
- Ideal op-amps, basic op-amp circuits
- Diodes: ideal diode model and constant-voltage-drop circuit models, applications in rectifiers and for snubbers
- Bipolar junction transistors: operations, circuit models and applications
- Field-effect transistors: operations, circuit models and applications
- Electronic instrumentation and measurements: sensor interfacing, control output, embedded computing systems

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Designation:

Elective