THE OHIO STATE UNIVERSITY
COLLEGE OF ENGINEERING

Power Electronics Lab

ECE 5127

Credit Hours:
1.00

Course Levels:
Undergraduate (1000-5000 level)
Graduate (5000-8000 level)

Course Components:
Lecture
Lab

Course Description:
Laboratory introducing basic circuits of power electronics, and simulation and control hardware and software for various power and energy applications.

Prerequisites and Co-requisites:
Prereq: 3040 (341) and enrollment in ECE major, or Grad standing in Engineering.

Course Goals / Objectives:
- Introduce basic topologies of power switching circuits
- Introduce fast switching characteristics of semiconductor devices
- Introduce switching characteristics of passive elements, including capacitors and inductors, in solid state circuits
- Introduce hardware and software used in power electronic switching circuits and power conditioning systems
- Study and implementation of Pulse-Width-Modulation for power electronic converters
- Investigate integration of power electronic converters with electric machines
- Study and implementation of current regulation loop by Pulse-Width-Modulation for power electronic converters
- Power electronics modeling, simulation and experimental verification

Course Topics:

- Basic DC-DC power electronic circuits
- Switching characteristics of IGBTs, power MOSFETs and other devices; switching characteristics of capacitors; and induction in power switching circuits
- PWM method and implementation in DC-AC conversion
- Integration and interaction of power inverters and electric machines
- DSP-controlled PWM current regulation
- Modeling and computer simulation of power electronic converters
- Experimental verification of power electronic modeling
- Hardware-in-the-loop and DSP applications in power electronics

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Designation:
Elective