Univnrsity of Wisconsin - Madison
College of Engineering [EGR]
Last Offered: 2015-2016 Fall [1162]
Direct Link to this Syllabus:

1. ECE 512, Power Electronics Laboratory
2. Credits: 3    Contact Hours: 7.1
3. Textbook and Materials:

ECE 512 Course Notes

a. Other Supplemental Materials: None

- Specific Course Information:

a. Brief description of the content of the course (Course Catalog Description): This laboratory introduces the student to measurement and simulation of important operating characteristics of power electronic circuits and power semiconductor devices. Emphasis is on devices, circuits, gating methods and power quality.

b. Pre-requisites or Co-requisites: ECE 412 or consent required

c. This is a Selected Elective course.

- Specific Goals for the Course:

a. Course Outcomes:

1. Use computer simulation software to test and verify design of power converters and their controllers.
2. Conduct experiments in hardware to test and verify design of power converter and their controllers.
3. Use microcontrollers to realize closed loop regulators for power converters.
4. Use general purpose power electronics hardware and software to realize a power control application and demonstrate its operation.
5. Document test results and develop engineering communications using reports
6. Make a technical presentation describing operation of a power control application
7. Conduct power engineering laboratory experiments following appropriate safety protocols

- **ABET Student Learning Outcomes**:

  (a) Ability to apply mathematics, science and engineering principles.
  (b) Ability to design and conduct experiments, analyze and interpret data.
  (c) Ability to design a system, component, or process to meet desired needs.
  (e) Ability to identify, formulate and solve engineering problems.
  (f) Understanding of professional and ethical responsibility.
  (g) Ability to communicate effectively.
  (i) Recognition of the need for and an ability to engage in life-long learning.
  (j) Knowledge of contemporary issues.
  (k) Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

- **Brief List of Topics to be Covered**:

  Passive half bridge rectifier, linear regulator, Semiconductor switch operation and characterization, PWM generation and state machine control, Boost converter open loop operation and testing, A to D conversion, current and voltage sensor tuning Closed loop digital control simulation and testing, Sinusoidal PWM and half bridge inverter.