Electrical Engineering 5520: Power Electronics  
Prior Number – Electrical Engineering 353

Credit and Contact Hours  
3 credit hours lecture (Three 50-minute or two 75-minute sessions per week are typical).

Instructor  
Jonathan Kimball, Ph.D.

Text(s)  
Power Electronic Circuits, I. Batarseh, Wiley, 2004 (optional)

Course Information  

Course Description  
Power semiconductor devices in switching mode converter and control circuits, phase-controlled rectifiers, synchronous inverters, AC regulators, cyclo-converters; self commuted inverters; and frequency changers; thermal analysis and protection. Applications to industry and HVDC.

Prerequisites  
Electrical Engineering 253.

Required or Elective  
Selected Elective

Course Goals  

General Outcomes  
1. Learn the principles of operation of power electronic converters  
2. Understand how to design dc-dc power converters  
3. Introduce the concept of switching losses  
4. Learn to design a feedback loop for a dc-dc converter  
5. Understand the principles of operation of soft switching converters
Relationship of Course to Program Outcomes

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S – strong connection; M – medium connection; W – weak connection

Topics Covered

1. Introduction (1/2 week)
2. Continuous Conduction Operation of DC-DC Converters (2 1/2 weeks)
3. Discontinuous Conduction Operation of DC-DC Converters (1/2 week)
4. Computer Simulation of Power Electronic Converters (1/2 week)
5. Isolated DC-DC Converters (2 1/2 weeks)
6. Soft Switching Techniques (1 1/2 weeks)
7. Small Signal Analysis and Feedback Design (2 weeks)
8. Single and Three-Phase Rectifiers (3 weeks)
9. DC-AC Inverters (1 1/2 weeks)
10. Reviews, Examinations, and Final Examination (1 1/2 weeks)