

Fall 2006
Special Topic
EE 490/890: Advanced Power Electronics

Instructor: Dr. Adel Nasiri

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Time: MW 07:00 PM - 08:15 PM, **Office Hrs:** MW 03:00 PM - 04:30 PM

Course Outline:

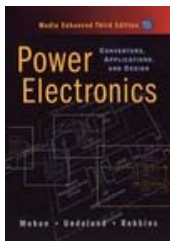
Single-phase and multi-phase controlled and uncontrolled rectifiers and inverters
Pulse-Width-Modulation (PWM) techniques
Resonant converters
Multi-level converters
Soft switching methods
Low-voltage high-current design issues
Advanced power electronic converters
Techniques to model and control switching circuits

Course Purpose:

Power Electronics is the technology for conversion and processing of electrical power and its application. It provides the basis for new electrical circuit architecture that provides substantial improvements in performance, flexibility, and productivity. It has verity of applications in different industries such as home appliances, automotive systems, telecommunication, aerospace, industrial automation, flexible AC transmission lines (FACT), and high voltage DC transmission (HVDC). This course provides a basic overview of power electronic devices and circuits. The fundamental of AC/DC rectifiers, DC/DC converters, DC/AC inverters, and AC/AC cycloconverters are discussed. Introductory analysis of advanced power electronic converters, resonant converters, multi-level converters, and soft switching methods are discussed. State space and generalized state space averaging techniques are explained. Power electronics systems such as uninterruptible power supplies and active filters are also discussed. The basics of digital control for power electronic systems using digital signal processors (DSP) are explained. Circuit analysis software such as Pspice, PSIM, and Matlab are used for system design and simulation.

Prerequisite:

EE 332: Solid State Devices, Circuits, and Systems II OR EE 335: Electronics II



Course Text:

Power Electronics: Converters, Applications and Design, Media Enhanced, Third Edition, by Ned Mohan, ISBN: 0471226939.