EEC 470  POWER ELECTRONICS I

Catalog data: EEC 470 Power Electronics. (4-0-4) Analysis, performance, characterization, and design of power electronics converters using diodes, thyristors, transistors and other controllable semiconductor switches. Application of power electronics converters to power supplies and to DC and AC motor drives.

Prerequisites: EEC 314 and EEC 361


Instructor: Dr. A. V. Stankovic, Assistant Professor of Electrical Engineering
Office hours: Tuesday and Thursday, 3:00-4:00 p.m. or by appointment.

Expected Outcomes: Upon completion of this course, students should be able to: 1. Understand power semiconductor switches
2. Understand the operation of different converters such as: line frequency diode and phase-controlled rectifiers, dc-dc switch-mode converters and dc-ac switch-mode inverters.
Fulfills The Following Electrical Engineering Program Objectives and Outcomes:

Objectives:

1) practice electrical engineering in power electronics.
2) define and diagnose problems, and provide and implement electrical engineering solutions in industry, business, and government.

Outcomes:

(a) an ability to apply knowledge of mathematics, science, and engineering to general electrical engineering and, in particular power electronics.
(b) an ability to design a system, component, or process to meet desired needs.
(c) an ability to identify, formulate, and solve electrical engineering problems.
(d) an ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

Contribution of Course to Meeting the Professional Component:
Math & Basic Science: 1 credits; Engineering Topics: 3 credits; General Education: 0 credits

Prerequisite by topics: 1. Kirchhoff’s voltage and current laws in R-L-C circuits.
2. Solution of first- and second-order differential equations.
3. Electric circuits in sinusoidal steady state.
4. Fourier series expansion of periodic waveforms
5. Simulation of electric circuits with PSpice.
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<td>Power Electronic Systems</td>
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<td>Semiconductor Devices</td>
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<td>Semiconductor Devices</td>
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<td>Review of Basic Electric Concepts</td>
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<td>Line Frequency Phase-Controlled Rectifiers</td>
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<td>DC-DC Switch Mode Converters</td>
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<td>Step-Down (Buck)</td>
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<td>Computer Lab – PSPICE</td>
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11 (Nov 8-12) DC-DC Converters
Step-up (Boost), Buck-Boost  7.4, 7.5

12 (Nov 15-19) 
Switch-Mode DC-AC Inverters  8.1-8.3

13 (Nov 22-26) Computer Laboratory (PSPICE)
Thanksgiving Holiday

14 (Nov 29- Dec3) Motor Drive Applications  12&13

15 (Dec 6-10) 
Motor Drive Applications  12&13
Review

**Grading:**

40% - Midterm Exam
45% - Final Exam
15% - Projects

**Homework:**

Has to be turned in on time.

**Computer Usage:**

Software: PSPICE

**Estimated ABET Category**

Engineering Topics: 4 credits or 100%

**Laboratory Projects:**

Power Converter Simulation by using PSPICE

**Prepared by:**

Dr. A. V. Stankovic  Date: 08 10 04

*There will be no make up mid-term and final exams unless a student turns in a written excuse from a physician or an employer.*