SAN FRANCISCO STATE UNIVERSITY

School of Engineering

Power Electronics

Fall 2009

Course description

Power Electronics device characteristics. Important circuit component design and analysis concepts. Uncontrolled and phase controlled rectifier circuits. DC to DC Converters, Switching Power Supply. Pulse Width Modulation. AC to DC inverter. Utility interference and Harmonic issues for power electronics Circuits

Class work = 3 unit, Lab work = 1 unit

Textbook

Fundamentals of Power Electronics 2nd Edition. By Robert W. Erickson and Dragan Maksimovic. Springer Science+Business Media, 2001

Reference

1. **Power Electronics Circuits, Devices, and Applications**, **2nd Edition**, by M.H. Rashid
2. **Power Electronics - Converters, Applications, and Design, 3rd Edition** By: N. Mohan, T.M. Undeland and W.P. Robbins, 2003. ISBN 0-471-22693-9
3. **An Introduction of Power Electronics**, **2nd Edition**, by B.M. Bird
4. **First Course in Power Electronics and Devices** by N. Mohan, 2003

Prerequisites by Topics:

1- Basic Electric Circuit Concepts
2- Working Principle of Rotating Machines
3- Basic Understanding of AC Power Systems
4- Circuit Simulation using PSpice or equivalent

Course Objectives:

1- To learn fundamentals of power electronics components and circuits analysis techniques, and design skills. [A.1, B.1]
2- To acquire basic understanding of various power converter modules used to build power electronics system. [B.1]
3- To acquire the ability to select and design suitable power converter modules/ system in order to meet requirements of industrial applications. [B.1]
4- To gain hands-on experience in designing, testing, and debugging power electronics circuits. [B.1,B.2, B.3]

Notes: The numbers in brackets refer to goals and objectives of the school of engineering.

Tentative Schedule

Table 1: A tentative schedule about instruction topics, quiz and homework

Week	Topics	Quiz	HW
1	Introduction		
2	Rectifies (not in the textbook)	1	1
3	Principles of steady-state converter analysis		
4	Steady State equivalent circuit modeling (1)	2	2
5	Steady State equivalent circuit modeling (2)	3	3
6	Power devices (1)		
7	Power devices (2)	4	4
8	AC equivalent circuit modeling (1)		
9	AC equivalent circuit modeling (2)	5	
10	Conversion circuits		
11	MidTerm		5
12	Magnetics		
13	Control circuits		
14	Comparator	6	6
15	Error amplifier		

Grading policy

Homework has 18 points, quiz has 24 points (4 point each quiz), midterm has 30 points, and final paper plus 15 minutes presentation has 28 points. The total is 100 points for the course work. The final score is consists of 75% course and 25% lab. The letter grade is based on the following table.

A	A-	B+	B	B-
>90%	85% ~ 89%	80% ~ 84%	75% ~ 79%	70% ~ 74%

C+	C	C-	D+	D	D-
65%~69%	60%~64%	55%~59%	50%~54%	45%~49%	40%~45%

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Course coordinator

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Instructor

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Office Hours:
Wednesday: 2:00 pm-5:00 pm at SCI 213C
Others by appointment.

Disability Statement Policy

Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by email (dprc@sfsu.edu). For more information, please check http://www.sfsu.edu/~dprc.

Observance of Religious Holidays

I will make reasonable accommodations for students to observe religious holidays when such observances require students to be absent from class activities. Please inform your absence ahead of the time so that I can make some arrangements.

Rules

1. No make up exams will be given without valid unavoidable reason with valid documented proof from a doctor, police officer, Court, etc.
2. If any student is **caught cheating as specified by the university handbook**, I will **report it to the department and strongly recommend University policy** including a **final grade of "F"** in the course.

The Laboratory and Projects rules will be handed out in the laboratory section