ECE 433 - Power Electronics
Spring 2013

Instructor: Maryam Saeedifard
Office: EE 146 (Electrical Engineering Building)
Email: maryam@purdue.edu

Lectures: Mondays, Wednesdays, Fridays (3:30 to 4:20 PM), Room: EE 115
Office Hours: Wednesday and Friday (4:30 -5:20 PM)

Course TA: Jaya Deepti Dasika
Office: EE57
Email: jdasika@purdue.edu
Office Hours: Monday and Tuesday 4:30 -5:30 PM at EE57

Course Website: https://engineering.purdue.edu/Courses/ECE433

Textbook: Power Electronics - Daniel Hart
Supplementary Textbook: Fundamentals of Power Electronics – Robert Erickson

Prerequisite: Undergraduate electronics course

Description: The primary objective of the course is to provide the students with a conceptual foundation for analysis and design of electronic circuits for conversion and control of electrical energy. The course covers the analysis, principles of operation, and control of power electronic converters including ac/dc converters, dc/dc converters, and dc/ac converters.

Homework: Periodic weekly or bi-weekly homework assignments will be assigned (5% of overall mark)

Projects:
- Project I: Modeling and Analysis of Dc-Dc Converters (5% of the overall mark)
- Project II: Modeling and Analysis of a 3-phase Inverter (5% of the overall mark)
- Project III: To Be Announced Later (5% of overall mark)

Quizzes: Quizzes will be held almost bi-weekly and will be pre-announced. (15% of the overall mark)
First Quiz: January 30, 2013
Exams: Exam I - (15% of the overall mark), Date: **February 21, 2013, Evening Exam at 6:30-8:00**
Exam II - (15% of the overall mark), Date: **March 28, 2013, Evening Exam at 6:30-8:00**
Cumulative Final Exam: (35% of the overall mark)
The location of the exams will be announced on the course web site.

**Academic Dishonesty:** All project reports and exams are to be an individual’s own work. You may discuss homework/projects with one another; however, the solution/report write-ups must be your own work. Copying on an exam or plagiarizing another student’s write-up will result in an F for the course. Late projects will result in a deduction of mark for that project.

**Emergency:** If you need to miss an exam because of an illness or family emergency, you should let the instructors know beforehand. If it is an illness, you will need a note from your doctor, with his/her name and contact number, saying that, based on the doctor’s best judgment, you need to miss the exam. A note simply saying that you have been to PUSH is not enough. The note does not need to say anything about the nature of the illness---that’s private information between you and your doctor. In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances. In such an event, information will be provided through the course website.

### Course Outline

<table>
<thead>
<tr>
<th>Lecture(s)</th>
<th>Topic</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Introduction/Background</td>
<td>Class Notes</td>
</tr>
<tr>
<td>9</td>
<td>Dc-Dc Converters</td>
<td>Class Notes</td>
</tr>
<tr>
<td>8</td>
<td>Inverters</td>
<td>Class Notes</td>
</tr>
<tr>
<td>6</td>
<td>Rectifiers</td>
<td>Class Notes</td>
</tr>
<tr>
<td>6</td>
<td>Power Semiconductor Devices/Interface Issues</td>
<td>Class Notes</td>
</tr>
<tr>
<td>5</td>
<td>Design of Closed Loop Controls</td>
<td>Class Notes</td>
</tr>
<tr>
<td>6</td>
<td>Design of Components</td>
<td>Class Notes</td>
</tr>
</tbody>
</table>
Course Grading Policy:
Midterm Exam I: 15%
Midterm Exam II: 15%
Cumulative Final Exam: 35%
Project I: 5%
Project II: 5%
Project III: 5%
Quizzes: 15%
Homework: 5%
Letter grades will be determined by the following guidelines:

≥ 90% A
≥ 80% B
≥ 70% C
≥ 60% D

Course Outcomes:

A student who successfully fulfills the course requirements will have demonstrated:

i. an understanding of the relationships between form and function and the roles played by various circuit components in ac-dc, dc-dc, and dc-ac converters. [a,c,k]
ii. a knowledge of the basic characteristics of switch types, and classification of converters. [a,e,k]
iii. a knowledge of principles of operation, switching techniques and control of ac-dc, dc-dc, and dc-ac converters. [a,e,k]
iv. a knowledge of the methods of sizing the switching and energy storage elements in ac-dc, dc-dc, and dc-ac converters. [a,c,k]