Course Information

EEPE 6354 Power Electronics

Professor Contact Information

Dr. Taylor Barton, ECSN 3.922, 972-883-6771, taylor.barton @utdallas.edu;

Office Hours: 4pm-5pm, Wednesdays (ECSN 3.922)

Course Pre-requisites, Co-requisites, and/or Other Restrictions

(including required prior knowledge or skills)

DC and AC analysis of electrical circuits, transformers, transfer functions, Bode plots, Laplace transform, Basics of electric machines, and semiconductor devices.

Course Description

- Introduction
 - Power Electronics and applications; Review of power devices and power device ratings
 - Review of harmonics and power factor in non-sinusoidal systems.
 - o AC-DC Phase Controlled Thyristor Converters
- DC-DC converters:
 - o Buck Converter, Boost Converter, Buck-Boost converter
 - o Flyback converters, Forward converter, Cuk and Full bridge and Half bridge
- DC- AC Inverters
 - Single phase and three phase bridge inverters
 - Square wave, Sinusoidal, and Space Vector PWM strategies
 - Current regulated inverters
- Special converters (Introduction and basic operation)
 - Active Rectifiers
 - Resonant Converters
 - o Multi-level converters
- Introduction to AC motor Drives Systems and control
- Power Electronics Systems and Applications

Student Learning Objectives/Outcomes

- 1. An understanding of the power electronics applications, power devices, and operation of ac-dc converters
- 2. Understanding of the topology of different dc-dc converters and the their design
- 3. Understand the operation and pulsewidth modulation strategies of inverters
- 4. Basic understanding of active rectifiers, multi-level converters, and overall integrated power electronic system.

Suggested References (not required)

- 1. Robert W. Erickson and Dragan Maksimovic, Fundamentals of Power Electronics, Second Edition, Kluwer Academic Publishers, 2001, ISBN 0-7923-7270-0.
- 2. Kassakian, Schlecht, and Verghese, Principles of Power Electronics, First Edition, Prentice Hall, 1991.
- 3. Mohan, Ned, Tore M. Undeland, William P. Robbins: Power Electronics: Converters, Applications and Design, J. Wiley & Sons, Inc.
- 4. M.H. Rashid, "Power Electronics Circuits, devices, and Applications, Pearson Prentice Hall

Suggested Course Materials:

Additional reading materials (e.g. IEEE journal and conference papers) will be assigned and distributed in lectures during the semester.

All class room presentation slides will be posted in the UTD eLearning system; however, written notes of other (non-slide-based) material will not be provided.

Assignments & Academic Calendar

(Topics, Reading Assignments, Due Dates, Exam Dates)

Weekly homework assignments will be due on lecture days when there is no quiz. Assignments may be given in the form of problem sets or paper reading and review. Late problem sets will not be accepted unless previously arranged with Dr. Barton. You may consult with fellow students in EEPE 6354, but you must hand in a unique, independently-completed solution. Use of course material from previous years is not allowed under any circumstances.

In-class exercises are designed to solidify understanding of the course material, and will not be graded or collected.

Exams will be closed book and closed notes, and will be given during part of regular class hours. Lecture **will** be held on those days during the remainder of the lecture period

Quiz 1: October 2 (1 hour) Quiz 2: November 13 (1 hour) Quiz 3: December 4 (2 hours, comprehensive exam)

A laboratory project will be scheduled in the last few weeks of the semester outside of regular class hours.

Grading Policy

(including percentages for assignments, grade scale, etc.)

Quiz 1: 20% Quiz 2: 20% Quiz 3: 40% [This test covers all the topics in the course] HW: 10% Project work: 10%

Course & Instructor Policies

(make-up exams, extra credit, late work, special assignments, class attendance, classroom citizenship, etc.)

Assignments are due by the specified time and date. Late submissions will not be accepted unless previously arranged with Dr. Barton.

Students have <u>one week</u> after a grade is posted or assignment returned (whichever is first) to review graded assignments or exams with the professor for any possible grading corrections. After one week no changes will be allowed.

Use of mobile/cellular phone, PDA, laptops, or other electronic devices or equipment is not allowed during the class or exam sessions. All such devices must be turned off or silenced and not used during classes and exams without prior permission from the professor.

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus.

Please go to http://go.utdallas.edu/syllabus-policies for these policies.

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the Professor.