ECE514: Power Electronics
Converter Topologies
- Introductory Lecture -

September 4, 2014
Course Staff

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Course Material

Textbook and Course Material

-Fundamentals of Power Electronics
by R. W. Erickson and D. Maksimovic

On-line version (UofT Library):
http://search.library.utoronto.ca/details?7927559&uuid=d7cacf8a-387a-482d-9e0c-c89b2d1c26c5

Lecture notes – will be available on the course web site

Note: This course is a 500-level, and there is no a single textbook covering all the material needed (nor giving you lots of practice problems). You will need to learn from notes, research papers, and recent articles (Quite common in engineering practice).
Course Material (blackboard)

- Lecture notes
  - Complementary course material
  - Interesting research papers
  - Links to the relevant web sites

- Lab notes and instructions
  - Plexim instructions

- Homework assignments and solutions
Laboratories

- Lab notes and instructions

- Intro lab (get to know software and simple assignments) + 5 course-material related labs

- Labs will have two parts
  - Pre-lab assignment
  - In-lab assignments
Homework Assignments and E.C. Policy

- Weekly or bi-weekly assignments

- 10% of the final grade (can consult with others but need to submit your own work)
  
  - Show all your work (partial credit will be given)

- Extra credits for challenging assignments (up to 5% or maximum ½ grade improvement)
  
  - Zero or full credit
  - You cannot consult with others (including course staff)
Mark Composition

- Homework assignments 12%
- Labs 15%
- Term test 1 (October 8th – 18:30 to 20:30) 14%
- Term test 2 (November 27th – 18:30 to 20:30) 14%
- Final Exam 45%
- Extra Credits (5%)
Course Objectives

To introduce you with various classes of power electronics converter topologies, explain their applications, principles of operation, and provide you with fundamental tools for the design and analysis.
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What is Power Electronics Converter?

A device that uses electronic components to efficiently transfers unregulated electrical energy into a well-regulated form.

\[
\eta = \frac{P_{\text{out}}}{P_{\text{in}}} \cdot 100\% \quad \text{Efficiency}
\]
Relevant Courses

ECE349/ECE354
Fundamentals of Energy Systems

- ECE413
  Energy Systems and Distributed Generation
- ECE463
  Electric Drives
- ECE554
  Power Electronics: Converter Topologies

- ECE533
  Power Electronics Switch-Mode Power Supplies
- ECE1066
  Design of HFSMPS – Control and Modeling
- ECE1057
  Static Power Converters I
- ECE1058
  Static Power Converters II
Power Electronics Converters - Applications

- Utility systems (conventional)/ hundreds of GW
- Marine, aircrafts, and electric/ hybrid vehicles/ from several kW to MW
- Electronic devices/ from a fraction of watt to several kW
Interdisciplinary Nature

- Circuit analysis
- Electromagnetics
- Control Theory
- Computer and Software Engineering
- IC design
- Mechanical design
- Automotive and aircraft industry
- ...