

# EEE598 High Power Converters and Drive Systems

Fall 2013

**Instructor:** Dr. Rajib Datta ERC575 Ph: (480) 465-7672 [rajib.datta@asu.edu](mailto:rajib.datta@asu.edu)

**Office hours:**

**Class:**

**Website:** <http://myasucourses.asu.edu>

**Catalog description:** Control of electric machines, control of grid-connected converters, multi-level converters, series and parallel connection of converters, industrial applications of high power converters

**Pre-requisite:** EEE 472/591, EEE473/591 or equivalent

Pre-requisite topics are fundamentals of power electronics, electrical machines and electric drives

**Reference books:** Werner Leonhard, “*Control of Electrical Drives*” Springer, Seyed Saeed Fazel, “*Multi-Level Converters for Medium Voltage Applications: Investigation and Comparison of MLCs for MV Applications*” LAP LAMBERT Academic Publishing.

**Computer usage:** Use of PLECS and/or MATLAB-Simulink for modeling and simulation.

## Major topics:

1. Review of basic power electronic converter topologies, pulse-width-modulation techniques, V/F control of electrical machines (2 weeks)
2. Field-oriented control of electrical machines (2 weeks)
3. Direct-torque and direct power control (1 week)
4. Grid-connected converter control (1 week)
5. Multi-level converter topologies – neutral point clamped, flying capacitor, cascaded H-bridge, modular multi-level (3 weeks)
6. Series and parallel connection of converters (1 week)
7. High power devices – IGBTs, GCTs (1 week)
8. Applications of high power converters – renewables, oil and gas, T&D (2.5 weeks)
9. Tests and discussions (1.5 weeks)

**Homework:** 4-5 homework problem sets and 1 project will be given. Assignments will involve numerical problems as well as modeling and simulation using PLECS/Matlab-Simulink. Project will be on design, modeling and simulation of a power conversion application. Students will have to submit a report along with their simulation files for the project. While discussions with other students and the instructor on homework are encouraged, copying or misrepresentation in any form is unacceptable.

## Grading:

Homework	20%
Project	30%
One midterm exam	20%
Final exam	30%