

ME490.2 / ENRGYEGR-490.1 Fall 2015

Modern Power Systems

Course Schedule

Classes: Tu,Th 10:05-11:20

Instructor

Neal Simmons, 309 Hudson Hall, 919-660-5297

Email – wns@duke.edu

Text Book

No text required. Handouts and note skeletons will be provided.

Supplemental Texts:

Electric Power Engineering Handbook (any edition)

Syed Nasar, Electric Machines and Power Systems, McGraw Hill, 1995

Steven Blume, Electric Power System Basics, IEEE Press, 2007

Stephen Chapman, Electric Machinery Fundamentals, McGraw Hill, 1999

Website

Duke Sakai for resources, email, and announcements

Course Description

Broad overview of fundamental and applied concepts of power generation, transmission and distribution from a systems point of view. Topics covered include but are not limited to generation methods; components of power grids, their functionality, and interdependence; power system behavior and performance; integration of renewable energy.

Prerequisites: ENRGYEGR 310 or ME 461 or consent of instructor.

Grading

Homework 30%

Quizzes 40%

Final Project 30%

Partial List of Topics to Be Covered

Electrical Systems Overview

- History / AC vs DC
- Electrical Basics
- Magnetism Basics
- Motors
- Inductors
- Polyphase Power (Wye, Delta)
- Real and Apparent Power
- Synchronous Generation
- Transformers

Generation

- Thermodynamics of Heat Engines
- Coal Fired Power Plants
- Natural Gas Fired Power Plants
- Nuclear Basics / Power Plants
- Solar-Thermal Generation
- Solar – Photovoltaic Generation
- Wind Generation
- Biogas Generation
- Hydroelectric Generation

Transmission/Distribution

- Transmission Lines/Equipment
- Substations
- Distribution Lines/Equipment
- Grid Reliability/Protective Devices
- Interconnections
- Regulation and Public Policy