ECE 610- Power System Analysis

Tentative Course Outline  

Fall 2013

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Office Hours: Tuesdays, Wednesdays, and Thursdays 1:00 to 2:00 PM or by appointment.

Prerequisites: B.S. in EE or ME.

Course Description: Steady-state analysis of power system networks, particularly real and reactive power flows under normal conditions and current flows under faulty conditions. Symmetrical components and digital solutions are emphasized.

Course Learning Outcomes: Students will learn aspects of power system analysis, operation, and control. The course covers modeling of some power systems components, especially transmission lines. This is followed by Load-Flow analysis, study of symmetrical and unsymmetrical faults, and economic operations of power systems.


Course Policy: The maximum number of points is 150, divided as follows:
Midterm test: 50 points
Final test: 50 points
50 points for homework, class participation, and short quizzes.

The Honor Code: Students should be familiar with NJIT Honor Code. This code will be rigorously upheld, any violations will be brought to the immediate attention of the administration. It is the responsibility of the student also to report to the instructor any observed violation of the Honors Code.

Time Requirements: This course is a three credit-hours course. Assuming the average load of a full-time student is 15 credit-hours, and assuming a full-time student works 45 hours/week towards his/her studies, then this course require 9 hours of study and class time per week on the average.

Software: The textbook (5th edition) includes integrated PowerWorld Simulator examples and problems. This software performs Load-Flow analysis and Optimal Power-Flow for power systems. You are encouraged to download the software and cases directly from the PowerWorld website. The link is given below; the 5th edition of the
book uses PowerWorld Simulator version 15. This version of the software is available for free to all for educational use. http://www.powerworld.com/gloversarma.asp
We will also occasionally use Matlab to solve some problems especially the Load-Flow problem.

**Weekly schedule:**

- **9/4** Review of power system networks, complex power  
  Ch. 2
- **9/11** Transformers, per unit system  
  Ch. 3
- **9/18** R and L parameters of transmission lines  
  Ch. 4
- **9/25** L and C parameters of transmission lines  
  HW 4-22, 25, 31  
  Ch. 4
- **10/2** Generator, load, transformer, per unit system  
  Ch. 3
- **10/9** Medium and short line approximation  
  Ch. 5
- **10/9** Power flow techniques – solving by the Gauss-Seidel method  
  Ch. 6
- **10/16** Test 1.
- **10/23** Power flow techniques – Solving by the Newton-Raphson method.  
  Ch. 6
  Ch. 6
- **11/6** Symmetrical Faults  
  Ch. 7
- **11/13** Symmetrical Components  
  Ch. 8
- **11/20** Unsymmetrical Faults  
  Ch. 9
- **11/27** Friday Schedule
- **12/4** Economic dispatch, neglecting generator limits and line losses  
  Economic dispatch with generator limits  
  Ch. 11
- **12/11** Power Systems Controls  
  Ch. 11
- **12/18** Final Examination