

ECE 610- Power System Analysis

Tentative Course Outline

Instructor: Dr. Walid Hubbi
Office: ECE 329

email: hubbi@njit.edu
Phone: (973) 596 3518

Office Hours: Office Hours: Tuesdays, Wednesday, and Thursday 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.

Textbook: "Power System Analysis and Design," by Glover, Sarma, and Overbye,
[Power System Analysis & Design, SI Version, 5th Edition](#)

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	
9/25	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
10/30	Power flow techniques – The Fast-Decoupled method, Sparsity, DC Load-Flow.	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	