EEO482: Power Systems Engineering I
Fall 2016

2015-2016 Catalog Description:

Surveys the field of modern energy systems, with the foundation being classical electrical power and related power electronics. Topics include complex power, per unit analysis, transmission line parameters and modeling, and compensation. Students also study alternative energy systems in this course. Course also includes use of a Power Simulation Program in which modeling can be done. This program is also used for the final system design project paper which accounts for 50% of the course grade.

Course Designation: Technical Elective

Credit Hours: 3

Text Book: Power Systems Analysis and Design, 5th by Glover, Sarma and Overbye (Thompson Learning 2007).

Prerequisites: EEO 323

Instructor: Jennifer Zirnheld, Ph.D.

Goals: Teach the student how to do a basic analysis of a three-phase power system, while opening their eyes to the socio-economic and ethical impact of power systems design and operation.

Course Learning Outcomes: Upon completion of the course, students will have

- The ability to use a standard power flow program to model a power system; be able to solve simple design problems, such as sizing of capacitors needed to correct low bus voltages or generation re-dispatch to remove transmission line constraints.
- The ability to defend their optimal solution for their chosen design project incorporating engineering standards and realistic constraints that include most of the following considerations: technical, economic, environmental, sustainability, manufacturability, ethical, health and safety, social, and political into a cohesive group project report.
- The ability to effectively communicate technical ideas to peer and supervisors.

Topics Covered:

Week 1.	Course introduction and introduction to history of electric power systems.
Week 2.	Electric Utility Industry Structure
Week 3.	Fundamentals
Week 4.	Phasors
Week 5.	Instantaneous Power
Week 6.	Complex Power
Week 7.	Balanced Three-Phase Circuits
Week 8.	Ideal Transformers
Week 9.	Equivalent Circuits/Per Unit
Week 10.	T-Lines
Week 11.	Conductor Spacing
Week 12.	Medium and Short Line Approximations – Pi Circuits
Week 13.	Faults – 3 Phase
Week 14.	Symmetrical Components / Sequence Networks
Week 15	Autotransformers
Week 16	Presentations

Class/laboratory Schedule: 3 lecture hours per week. Two outside of lecture tours.

Student Outcomes	**% contribution***
✓ (a) an ability to apply knowledge of mathematics, science and engineering	10
❑ (b1) an ability to design and conduct experiments	10
✓ (b2) an ability to analyze and interpret data	10
✓ (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	10
✓ (d) an ability to function on multi-disciplinary teams	5
✓ (e) an ability to identify, formulate, and solve engineering problems	10
✓ (f) an understanding of professional and ethical responsibility	5
✓ (g) an ability to communicate effectively	10
❑ (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context	5
✓ (i) a recognition of the need for, and an ability to engage in life-long learning	10
✓ (j) a knowledge of contemporary issues	5
✓ (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	10
❑ Any other outcomes and assessments?	

* Assume that the total contribution of any course will be 100%. Use the right hand column to indicate the approximate percent that the left hand columns contribute to the overall course.

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