KING FAHD UNIVERSITY OF PETROLEUM AND MINERALS

Department of Electrical Engineering

EE-520 Power System Steady State Analysis

Course Syllabus 171

Instructors	OFFICE	PHONE	OFFICE HOURS	E-MAIL
I.O. Habiballah (IOH)	**59-2080**	**4985**	**MW 11:00-11:45 am & 12:20-12:45pm (or by e-mail)**	**ibrahimh@kfupm.edu.sa**

Course Timing: MW 5:00 - 6:15 pm **Course Location:** 59-1016

Textbook

Power System Analysis, by **Hadi Saadat,** McGraw Hill WCB, 3rd ed., 2010 & **Class Notes**

Pre-Requisite Knowledge and Capabilities

Students attending this graduate course are assumed to have the ability in analyzing single-phase & three-phase circuits. The basic understanding of modeling and analyzing transformers, and AC machines. They are assumed to have good mathematical skills to work with matrix algebra, complex numbers, vectors, first and second order differential equations.

Course Description

The course provides the theoretical background required to model and analyze large power systems. This includes modelling of major components in power system: AC machines, transformers, and transmission lines for steady-state and transient conditions. The use of per-unit calculations. Basic understanding of programming performance. Conducting power-flow (load-flow) analysis using different mathematical techniques. Analyzing balanced and unbalanced power system faults: symmetrical and unsymmetrical short-circuits. Understanding the basic knowledge of power system stability. The use of a popular industrial simulation tools and packages (ETAP, EDSA, Powerworld Simulator, …etc.).

Learning outcome

Upon completion of this course, students would be able to understand:

- Modelling of AC machines, transformers, transmission lines.
- Principles of per-unit calculations.
- Basic programming techniques used in power systems.
- Principles of conducting power-flow studies.
- Principles in modelling and analysis of power systems subject to symmetrical and unsymmetrical faults.
- Basic principles of power system stability.
- The use of an industrial power system simulator.

Chapters	No. of Weekes	Topics
2-3, 5	1	Basic Concepts; (Chapter 2, 3.2, 3.6, 5.2, 5.3) Per-Unit System (3.13,3.14)
6, 9	1	Power System Matrices (6.2, & 9.6)
Notes	1	Programming Considerations (Extra Notes)
6	3	Power Flow Analysis (6.1, 6.3-6.10)
9	2	Balanced Fault (9.1-9.5)
10	3	Symmetrical Components and Unbalanced Fault (10.1-10.9)
11	2	Stability (11.1-11.6)
	2	Term-papers & Project Presentations

Grading:

Quizes	:	15 %
Midterm Exam (November 2017)	**:**	**20 %**
Term Paper	:	15 %
Project	:	20 %
Final Exam (January 2017)	**:**	30 %

Homeworks:

Each student should work all homework problems on an individual basis (no grading).

Term Paper:

Each student should prepare a formal term paper on the latest development in a subject related to one of the course materials and make short presentation in the class about his term paper. Students are recommended to look into practical industrial publications.

Project:

The term project is to simulate (using a particular industrial power system tool) and analysis study cases for a practical power system. Each student must submit his written individual report before the end of the semester. Each student's performance is evaluated based on the submitted report, and on his case analysis results.