Philadelphia University

Faculty of Engineering - Department of Computer Engineering

Course Details:

Title: Power System (2) (0610412)

Prerequisite: power systems (1) (0610411)

Credit Hours: 3 credit hours (16 weeks per semester, approximately 45contact hours)

Textbook: Power System Analysis, John J.Grainger and William D. Stevenson, Jr.-McGraw-Hill1994.

References:

1- Hadi Sadat: "Power System Analysis", 3rd 2010, M.C Graw Hill.
2- J.Duncan Glover, and Mulukutla S.Sarma: "Power System Analysis and Design", 3rd, 2001, Thomson Engineering.

Course Description: Load flow (power flow). The stability of the power lines and generation. The distribution of the load between units in the electrical plant. Protection of power systems for Symmetrical and unsymmetrical calculation.

Course Outlines:

Week	Topic
1	Complex power flow on transmission line, node equation, the bus admittance matirx
2, 3	Definition of the load flow problem and the power flow equations. Slack, generator and load buses
4	Iterative solution of the power flow equations using Gauss-Seidal method
5	Iterative solution of the power flow equations using Newton-Raphson method
6-7	The stability problem of single machine connected to infinite bus: rotor dynamics and the swing equation
8-9	The power angle equation and determination of stability using the equal-area criterion, critical clearing angle and critical clearing time
10-12	Introduction to power system protection: over-current relay coordination
13-15	Economic dispatch: introduction to the optimization problem, cost versus plant output characteristics, incremental fuel cost, distribution of load between plants.
16	Revision

Course Learning Outcomes with reference to ABET Student Outcomes:

Upon successful completion of this course, student should:

1.	Know of electrical networks analysis and their component.	[a, c, e]
2.	Understand the steady - state and transient - state stability of a power system	[a, c, e]
3.	Understand the importance of power flow analysis in the network.	[a, c, e]
4.	Know the optimal operation of generating units in a power system and determine the economic power dispatch for the grid	[a, c, k]

Assessment Guidance:

Evaluation of the student performance during the semester (total final mark) will be conducted according to the following activities:

Sub-Exams:	The students will be subjected to two scheduled written exams, first exam and second exam during the semester. Each exam will cover materials given in lectures in the previous 3-4 weeks.
Quizzes:	(3-5) quizzes of (10-15) minutes will be conducted during the semester. The materials of the quizzes are set by the lecturer.
Collective Participation:	Brain storming and collective discussions will be carried out during any lecture. Individual student will be assessed accordingly.
Final Exam:	The students will undergo a scheduled final exam at the end of the semester covering the whole materials taught in the course.

Grading policy:

First Exam	20%
Second Exam	20%
Quizzes and participation	20%
Final Exam	40%
Total:	100%

Attendance Regulation:

The semester has in total 16 weeks. Total absence hours from classes must not exceed 15% of the total week. Exceeding this limit without a medical or emergency excuse approved by the deanship will prohibit the student from sitting the final exam and a zero mark will be recorded for the lab. If the excuse is approved by the deanship the student will be considered withdrawn from the course.

June, 2018