The University of Texas at Tyler
Department of Electrical Engineering
Houston Engineering Campus

Course: EENG 4310 – Electric Power Systems (Required)

Syllabus

Catalog Description:

Magnetic circuits; principles of electromagnetic energy conversion; synchronous machines; three-phase induction machines; Transformers; DC machines; fundamentals of power systems modeling and design; power flow analysis.

Prerequisites: EENG 3303, EENG 3305, Pre or Co-requisite MATH 3203

Credits: 3 (3 hours lecture, 0 hours laboratory per week)

Text(s): (Required) Glover, Sarma, and Overbye, "Power System Analysis and Design" 6th ed., Thomson, 2016.

Additional Material: (Recommended)

Reference(s):
1. Hindmarch, Electrical Machines and their Applications, Pergamon Press, 2nd ed., 1970.
2. Stevenson and Grainger, Power System Analysis, McGraw-Hill, 1996
3. Matlab®
4. Selected articles published in selected journals and conference proceedings
5. Instructor's lecture notes

Course Coordinator: Seyed Ghorshi, PhD

Topics Covered:

1. Review of 3-phase Circuits and Systems
2. AC Power
3. The Per-Unit System
4. Power Transformers
5. Induction Machines
6. Synchronous Machines
7. Introduction to Power System Modeling
8. Power Transmission Line Models
9. Introduction to Load Flow Analysis
10. Short Circuit Analysis
11. Power Factor Correction.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Reports / Paper
4. Computer Programming
5. Project / Model
6. Presentation
7. Course Participation eer Review

Course Learning Outcomes (formerly Objectives)[1]: By the end of this course students will be able to:

1. Solve 1-phase and 3-phase circuits for current, voltage, and power [1]
2. Develop and solve the power transmission line models [1,3]
3. Develop and solve the load flow problem in electric power systems [1]
4. Develop and apply the synchronous machine circuit model to determine the impedance, efficiency, and voltage regulation using the EMF and MMF methods [1]
5. Develop and apply the 3-phase induction motor circuit model to determine the machine characteristics and performance measures [1]
6. Determine capacitor size to improve power factor (power factor correction) [1,4]
7. Analyze the fault current (symmetrical fault) in a simple power system [1,4,5]
8. Develop and solve the power transformer circuit model to determine its characteristics and performance [1]
9. Setup experiments to characterize power transformer [3]
10. Setup experiments to characterize the three-phase induction motor [3]
11. Setup experiments to characterize the synchronous machine [3]
12. Setup experiments to characterize power transmission lines [3]
13. Write a paper on the impact of electric power engineering on ethics and professional practice in electric power engineering [3]

[1]*Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering. [2,5]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering. [3]
3. have the ability to analyze electrical circuits, devices, and systems [1,7,8]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements. [19]
5. have the ability to design and conduct experiments, and analyze and interpret experimental results. [9,10,11,12]
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using [6] appropriate theoretical and experimental methods. [5]
7. have effective written, visual, and oral communication skills. [17]
8. possess an educational background to understand the global context in which engineering is practiced, including
   a. knowledge of contemporary issues related to science and engineering. [10]
   b. the impact of engineering on society. [21]
   c. the role of ethics in the practice of engineering.[13]
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams.[20]
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers. [4]

[2]*Numbers in brackets refer to course learning outcomes/objective(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0.25	hours
Engineering Sciences and Design:	2.75	hours
General Education Component:	0	hours

Prepared By:	Hassan El-Kishky	Date:	07/15/2011
Modified:	Hassan El-Kishky	Date:	08/16/2012
	Seyed Ghorshi	Date:	08/25/2013
			08/26/2014
			08/25/2015
			08/22/2016
			08/22/2018

EENG 4310-Electric Power Systems

Fall 2018 Syllabus

Instructor Information:

Seyed Ghorshi, PhD
Department of Electrical Engineering,
The University of Texas at Tyler
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Course Description:
The objective of this course is to study three phase circuits and systems as well as the ac power. The course will focus on fundamentals of electromechanical energy conversion, magnetic circuits, power transformers, induction motors, synchronous machines, introduction to power system modeling-transmission line models.

Course Content:
The primary student learning objectives are:

Three-phase Circuits and Systems
AC Power
Fundamentals of Electromechanical Energy Conversion
Magnetic Circuits
Power Transformers
Induction Machines
Synchronous Machines
Direct Current Motors
Introduction to Power System Modeling-Transmission Line Models
Introduction to Load Flow Analysis
Fault Analysis-Symmetrical Faults
Power Factor Correction.

Recommended Textbook:
Glover, Sarma, and Overbye, “Power System Analysis and Design” 6th ed., Thomson, 2016

Evaluation and Grading:
Homework (10%)
Assignment (10%)
Midterm Exam (40%)
Final Exam (40%)