The University of Texas at Tyler
Department of Electrical and Computer Engineering

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. Stephen Chapman, Electric Machinery Fundamentals, McGraw-Hill, 5th ed., 2012.
2. Stevenson and Grainger, Power System Analysis, McGraw-Hill, 1996.
3. MATLAB®
4. Instructor's lecture notes.

Course Coordinator: Yasser Mahgoub

Topics Covered:

1. AC Power and 3-Phase Systems
2. Power Factor Correction
3. Power Transformers
4. Induction Machines
5. Synchronous Machines
6. Power Transmission Line Models
7. Introduction to Load Flow Analysis
8. Introduction to Renewable Energy

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

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 [4,5]

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. Develop and apply DC machines circuit models to determine the machine characteristics and performance [1,3]
8. Develop and solve the power transformer circuit model to determine its characteristics and performance [1]
9. Design an electrical system and submit a report following the design guidelines and published standards [3]

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

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

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. [1-8]
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors. [9]
3. an ability to communicate effectively with a range of audiences [1-8]
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts. [6]
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions [7,8]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies. [8,9]

[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	hours
Engineering Sciences and Design:	3.0	hours
General Education Component:	0	hours

Prepared By:	Hassan El-Kishky	Date:	07/15/2011
Modified By:	Hassan El-Kishky	Date:	08/16/2012 08/25/2013 08/26/2014 08/25/2015 08/14/2016 08/23/2017 08/27/2018 08/21/2019 11/17/2019
	Yasser Mahgoub	Date	08/18/2020 08/20/2021 08/19/2026