

The University of Texas at Tyler
Department of Electrical Engineering

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

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. Stephen J. Chapman, "Electric Machinery Fundamentals," McGraw-Hill, 4th edition, 2005.
5. Lecture notes

Course Coordinator: Hassan El-Kishky, Ph.D., P.E.

Topics Covered:

1. Introduction to 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 Systems

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 Peer 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 [1,5]
2. Use transmission line models to characterize and solve transmission and distribution problems [1,3,5]
3. Solve the load flow problem in electric power systems using Gauss-Seidel method [3,4]
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 in electrical systems [1]
7. Develop and solve the power transformer circuit model to determine transformer characteristics and performance metrics[1,3]
8. Design an electrical system and submit a report following the design guidelines and published standards[3]
9. Size a simple Photo-voltaic system [1]

¹Numbers 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 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. [1-9]
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. [8]
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]

²Numbers 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

Revised 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

08/18/2026