

**The University of Texas at Tyler  
Department of Electrical Engineering**

**Course: EENG 4110 – Electric Power Systems Lab (Elective)**

**Syllabus**

**Catalog Description:**

Electric power circuit measurements; magnetic circuits; transformers; synchronous machines, induction machines, and DC machines performance, measurements, and analysis.

**Pre- or co-requisite:** EENG 4310

**Credits:** 1 ( 0 hours lecture, 3 hours laboratory per week)

**Text(s):** N/A

**Additional Material:** Instructor's Lab Sheets

**Course Coordinator:** Hassan El-Kishky, Professor of Electrical Engineering

**Topics Covered:**

- Electric Power Measurement
- Equivalent circuit of power transformers
- Voltage regulation of power transformers
- Efficiency of power transformers
- Equivalent circuit of 3-phase induction motors
- Three-phase induction motor characteristics
- Characteristics of synchronous machines
- Transmission line modeling and voltage regulation

**Evaluation Methods:**

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

**Course Objectives<sup>1</sup>:** By the end of this course students will be able to:

1. set up experiments to measure three-phase power and submit reports [3,6].
2. Set up experiments to determine the equivalent circuit of a power transformer and submit reports [3,6].
3. Set up experiments to determine the voltage regulation of a power transformer and submit reports [3,6].
4. Setup experiments to determine to determine the efficiency of a power transformer and submit reports [3,6]
5. Set up experiments to determine the equivalent circuit parameters of 3-phase induction motors and submit reports [3,6].

6. Set up experiments to determine the characteristics of 3-phase induction motors and write submit reports [3,6].
7. Set up experiments to determine the characteristics of synchronous machines and write submit reports [3,6].
8. Set up experiments to determine characteristics of power transmission lines and submit reports [3,6].

<sup>1</sup>Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Program Outcomes<sup>2</sup>: This course supports the following Electrical Engineering Program Outcomes, which state that our students will have:

Graduates of the electrical engineering curriculum of the University of Texas at Tyler will:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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.
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.
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 [1-8].**
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

<sup>2</sup>Numbers in brackets refer to course objective(s) that address the Program Outcome.

### Disability Support Service

"If you have a disability, including a learning disability, for which you request an accommodation, please contact Ida MacDonald in the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Support Services counselor. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579)."

Prepared By: Hassan El-Kishky

Date: 08/20/2001  
 08/14/2002  
 08/23/2003  
 08/25/2017  
 08/17/2018  
 08/21/2019  
 11/06/2019  
 08/02/2020

# **EENG 4110 Electric Power Systems Lab**

Fall 2020

Class Time: 2:00 – 4:45pm TTh

Location: RBN 1027

Coordinator: Hassan El-Kishky

Office: RBN 2005

Tel: (903) 565-5580

Fax: (903) 565-5877

Email: [helkishky@uttyler.edu](mailto:helkishky@uttyler.edu)

Office Hours: By appointment online only

Textbook: No textbook

References: Hindmarch, Electrical Machines and Their Applications, Pergamon Press, 1970.  
MATLAB®, Mathworks

Additional: Instructor's handouts  
Materials

Software: MATLAB®

Contents:	AC Power Measurement	09/01
	Transformer lab 1	09/08
	Transformer Lab 2	09/15
	Transformer Lab 3	09/22
	Induction motors lab 1	09/29
	Induction motors lab2	10/06
	Lab Review	10/13
	Exam 1	10/20
	Synchronous machines lab 1	10/27
	Synchronous machines lab 2	11/03
	Transmission Line Models lab 1	11/10
	Transmission Line Models lab 1	11/17
	Lab Review	12/01
	Final Exam	12/08

Prerequisite Pre or corequisite EENG 4310

Grading:

Exam 1	10%
Final Exam	15%
Labs	75%

