

The University of Texas at Tyler  
Department of Electrical 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): Glover, Sarma, and Overbye, "Power System Analysis and Design" 6<sup>th</sup> ed.,  
(Required) Thomson, 2016.

Additional  
Material:  
(Recommended)

Reference(s):

1. Stephen Chapman, Electric Machinery Fundamentals, McGraw-Hill, 5<sup>th</sup> ed., 2012.
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: Yasser Mahgoub

Topics Covered:

1. AC Power and Power Factor Correction
2. Power Transformers
3. Induction Machines
4. Synchronous Machines
5. Introduction to DC Machines
6. Introduction to Power System Modeling
7. Power Transmission Line Models
8. Introduction to Load Flow Analysis
9. 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)<sup>1</sup>: 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]

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

**Relationship to Student Outcomes (only items in dark print apply)<sup>2</sup>:** 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. [1-5]
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.

<sup>2</sup>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

<b>Prepared By:</b>	Hassan El-Kishky	<b>Date:</b>	07/15/2011
<b>Modified:</b>	Hassan El-Kishky	<b>Date:</b>	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	<b>Date</b>	08/18/2020 08/20/2021

The University of Texas at Tyler  
Department of Electrical Engineering

EENG 4310 – Electric Power Systems

2021 Fall Semester

COURSE OUTLINE

Course Coordinator:

**Dr. Yasser Mahgoub**

**Office:** HEC-A205

**Email:** ymahgoub@uttyler.edu

**Office Hours:** Tuesday, Thursday, 1-2 PM, or by appointment

Class Location/Time: HEC A218, 11:00 am - 12:20 pm, Tu Tr

Grading Policy:

Quizzes (2)	20%
Midterm Exam	20%
Homework (4)	20%
Final Exam	35%
Class Attendance	5%
<b>Total</b>	<b>100%</b>

Semester Schedule:

Week	Start Date	Topic / Activity
1	24-Aug.	Introduction and Review of Basics
2	31-Aug.	Fundamentals of Power Systems
3	07-Sep.	Power Factor Correction
4	14-Sep.	Power Transformers
5	21-Sep.	Power Transformers / <b>Quiz 1</b>
6	28-Sep.	Induction Machines
7	5-Oct.	Induction Machines
8	12-Oct.	<b>Midterm Exam</b>
9	19-Oct.	Synchronous Machines
10	26-Oct.	Synchronous Machines
11	2-Nov.	Transmission Lines
12	9-Nov.	Transmission Lines / <b>Quiz 2</b>
13	16-Nov.	Power Flows
---	23-Nov.	Thanksgiving Break, no class
14	30-Nov.	Power Flows
15	7-Dec.	<b>Final Exam</b>

**Grading scale:**

90-100– A; 80-89–B; 70-79–C; 60-69 – D; <60 – F.

**Attendance Policy:**

Students are expected to attend all scheduled lectures and lab meetings. By signing up for the class it is understood that the student has checked for ANY significant recurring conflicts with lecture and laboratory meeting times (including work, family, or any other commitments). No exceptions can be made for attendance requirements as this will be unfair to the other students. The progressive nature of the class means that perfect attendance is recommended if a good grade is desired. No more than three excused absences for valid reasons are allowed and documentation should be submitted for each absence. Class participation is graded based on attendance, faculty and graduate assistant observation and involvement in class activities

**Students Rights and Responsibilities**

To know and understand the policies that affect your rights and responsibilities as a student at UT Tyler, please follow this link: <http://www.uttyler.edu/wellness/rightsresponsibilities.php>

**Grade Replacement/Forgiveness and Census Date Policies :**

Students repeating a course for grade forgiveness (grade replacement) must file a Grade Replacement Contract with the Enrollment Services Center (ADM 230) on or before the Census Date of the semester in which the course will be repeated. Grade Replacement Contracts are available in the Enrollment Services Center or at <http://www.uttyler.edu/registrar>. Each semester's Census Date can be found on the Contract itself, on the Academic Calendar, or in the information pamphlets published each semester by the Office of the Registrar.

Failure to file a Grade Replacement Contract will result in both the original and repeated grade being used to calculate your overall grade point average. Undergraduates are eligible to exercise grade replacement for only three course repeats during their career at UT Tyler; graduates are eligible for two grade replacements. Full policy details are printed on each Grade Replacement Contract.

The Census Date is the deadline for many forms and enrollment actions that students need to be aware of. These include:

- Submitting Grade Replacement Contracts, Transient Forms, requests to withhold directory information, approvals for taking courses as Audit, Pass/Fail or Credit/No Credit.
- Receiving 100% refunds for partial withdrawals. (There is no refund for these after the Census Date)
- Schedule adjustments (section changes, adding a new class, dropping without a “W” grade)
- Being reinstated or re-enrolled in classes after being dropped for non-payment
- Completing the process for tuition exemptions or waivers through Financial Aid

**State-Mandated Course Drop Policy**

Texas law prohibits a student who began college for the first time in Fall 2007 or thereafter from dropping more than six courses during their entire undergraduate career. This includes courses dropped at another 2-year or 4-year Texas public college or university. For purposes of this rule, a dropped course is any course that is dropped after the census date (See Academic Calendar for

the specific date). Exceptions to the 6-drop rule may be found in the catalog. Petitions for exemptions must be submitted to the Enrollment Services Center and must be accompanied by documentation of the extenuating circumstance. Please contact the Enrollment Services Center if you have any questions.

### **Disability Services**

In accordance with federal law, a student requesting accommodation must provide documentation of his/her disability to the Disability Services counselor. If you have a disability, including a learning disability, for which you request an accommodation, please contact the Disability Services office in UC 3150, or call (903) 566-7079.

### **Student Absence due to Religious Observance**

Students who anticipate being absent from class due to a religious observance are requested to inform the instructor of such absences by the second class meeting of the semester.

### **Student Absence for University-Sponsored Events and Activities**

If you intend to be absent for a university-sponsored event or activity, you (or the event sponsor) must notify the instructor at least two weeks prior to the date of the planned absence. At that time the instructor will set a date and time when make-up assignments will be completed.

### **Social Security and FERPA Statement:**

It is the policy of The University of Texas at Tyler to protect the confidential nature of social security numbers. The University has changed its computer programming so that all students have an identification number. The electronic transmission of grades (e.g., via e-mail) risks violation of the Family Educational Rights and Privacy Act; grades will not be transmitted electronically.

### **Emergency Exits and Evacuation:**

Everyone is required to exit the building when a fire alarm goes off. Follow your instructor's directions regarding the appropriate exit. If you require assistance during an evacuation, inform your instructor in the first week of class. Do not re-enter the building unless given permission by University Police, Fire department, or Fire Prevention Services.