

**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.
(Required)

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

Topics Covered:

1. AC Power and Power Factor Correction
2. Power Transformers
3. Induction Machines
4. Synchronous Machines
5. Intro to DC Machines
6. Introduction to Power System Modeling
7. Power Transmission Line Models
8. Introduction to Load Flow Analysis
9. Power Factor Correction.
10. Intro to Power Electronics
11. Intro 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 **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]
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. Analyze basic power electronics circuits and systems [1]
10. Design an electrical system and submit a report following the design guidelines and published standards[3]

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 Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering. [1-8]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering. [2-8]
3. have the ability to analyze electrical circuits, devices, and systems [1-8]
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 [1-8] 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.[10]
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. [9, 10]

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
Modified:	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

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

**EENG 4310.001/040: Electric Power Systems
Fall'20**

COURSE OUTLINE

Course Coordinator: Hassan El-Kishky, Ph.D., P.E.
Electrical Engineering
Office: RBN 2004
Phone: 903-565-5580
E-mail: helkishky@uttyler.edu

Class Location/Time: RBN 2012 / 11:00AM-12:20PM T Th

Grading Policy:

Midterm Exam 1 (Canvas)	25%
Midterm Exam 2 (Canvas)	25%
Final Exam (Canvas)	35%
Semester project	10%
Power Flow Project	5%

Semester Schedule:

WEEK	START DATE	LECTURE (T)	LECTURE (Th)	Notes
1	24 Aug 2020	Introduction to power systems	Three-phase circuits and systems, AC power	
2	31 Aug 2020	Power Factor Correction	Worked problems	
3	07 Sep 2020	Transformers Principle and basic operation	Power Transformers Equivalent Circuits	
3	14 Sep 2020	Power Transformers Operation, Characteristics	Distribution Transformers	Assign semester project/paper
4	21 Sep 2020	Worked problems	3-ph Induction Motors Principle and Basic Operation	Prepare for exam 1
4	28 Sep 2020	3-phase IM Equivalent Circuits	3-ph Induction Motors Characteristics	
5	05 Oct 2020	3-ph Induction Motors Characteristics	Worked problems	
6	12 Oct 2020	Synchronous Machines Principle and Basic Operation	Exam 1	
7	17 Oct 2020	Synchronous Machines Equivalent Circuits and Characteristics	Worked problems	Graded exam returned to students
8	19 Oct 2020	Power Transmission Line Models and Characterization	Power Transmission Line Models and Characterization	
9	26 Oct 2020	Power Transmission Line Models and Characterization	Worked problems	Prepare for exam 2
10	02 Nov 2020	Power Flow Analysis Develop the Power Flow Problem	Power Flow Analysis Gauss-Seidel Solution Technique	

11	09 Nov 2020	Power flow analysis project work session	Exam 2	
12	16 Nov 2020	Symmetrical faults	Symmetrical faults	Power flow project is due (5%) Graded exam is returned to students
13	23 Nov 2020			Thanksgiving Holiday
14	30 Nov 2020	Worked problems	Workshop	ALL MATERIALS DUE Thursday, Dec. 3, 2020
15	7 Dec 2020			Finals Week

NOTE: Please maintain a class folder with all your work including class notes, homework and lab assignments, quizzes, and mid-term exam.

Academic Integrity:

Students should be aware that absolute academic integrity is expected of every student in all undertakings at The University of Texas at Tyler. Failure to comply can result in strong university-imposed penalties. **All lab reports and assignments will be verified using plagiarism checking software and violations will result in a grade of zero for the lab report or assignment at a minimum, and possibly stronger penalties such as a failing grade in the course and a scholastic dishonesty report submitted to the university.**

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 including invited talks and IEEE meetings.

Student Conduct Policy:

Any behavior which distracts from the learning experience of other students is not allowed and will result in corrective action by the instructor/staff. Students are also expected to follow all safety rules and guidelines in the laboratory setting.

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.