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

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: Fatemeh Kalantari

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

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 [1]
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. Analyze the fault current (symmetrical fault) in a simple power system [1,4,5]
8. Develop and solve the power transformer circuit model to determine its characteristics and performance [1]
9. Setup experiments to characterize power transformer [3]
10. Setup experiments to characterize the three-phase induction motor [3]
11. Setup experiments to characterize the synchronous machine [3]
12. Setup experiments to characterize power transmission lines [3]
13. Write a paper on the impact of electric power engineering on ethics and professional practice in electric power engineering [3]

[1]*Numbers 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. [2,5]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering. [3]
3. have the ability to analyze electrical circuits, devices, and systems [1,7,8]
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 [6] 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.[13]
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. [4]

[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:	0.25	hours
Engineering Sciences and Design:	2.75	hours
General Education Component:	0	hours

Prepared By:	Hassan El-Kishky	Date:	07/15/2011-08/16/2016
Modified:	Seyed Ghorshi	Date:	08/16/2018
	Fatemeh Kalantari	Date:	08/25/2019

Grading:

Exam 1 25% PU system, 3-phase, AC power, power factor correction, Transformers

Exam 2 25% Induction motors, Synchronous machines, Transmission line models

Final Exam 35% Comprehensive

Projects 10% Programming intensive

Assignments 10% No late assignments will be accepted.

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.

Note:

If you have a disability, including a learning disability, for which you request disability support services/accommodation(s), please contact the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability support services/accommodation(s) must provide appropriate documentation of his/her disability to the Disability Support Services counselor. In order to assure approved services the first week of class, diagnostic, prognostic, and prescriptive information should be received 30 days prior to the beginning of the semester services are requested. 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)." Additional information may also be obtained at the following UT Tyler Web address: http://www.uttyler.edu/disabilityservices.

Grade Replacement Policy:

If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grade point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

The University of Texas at TYLER
COLLEGE OF ENGINEERING

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EENG 4310 – Electric Power Systems

Course Syllabus-Outline

Semester / Year	Fall 2019
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
Section number	031
Instructor name	Fatemeh Kalantari
Contact info	Email: fkalantari@uttyler.edu
Class Type / Location	Face- to- face, HEC 218
Class Time	Tuesday Thursday 11:00 - 2:20 pm
Office Hours	Wednesday 1-3 pm
Credits	3 credits
Required Textbook	Glover, Sarma, and Overbye, "Power System Analysis and Design" 6th ed., Thomson, 2016.
Optional References	Hindmarch, Electrical Machines and their Applications, Pergamon Press, 2nd
Additional requirements	Instructor's lecture notes. MATLAB.
Evaluation Method	Midterm 1 25% Midterm 2 25% Final Exam 35% Projects 10% Assignments 5%
Grading Policy / Scale	Letter grades Scale: A 90 – 100 B 80 – 89 C 70 – 79 D 60 – 69 F < 60
Important events / dates	Census date: Last day to withdraw: Final date: Per published schedule by the registrar

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Attendance / Makeup policy	Regular attendance is imperative if you want to do well in this course. Therefore, any student incurs four unexcused absents or more during the 15-week semester will result in an instant F grade for the course. In case you have an excuse to miss a class, it is your responsibility to keep up with the class work and be informed of all announcements made in the class on homework, tests etc.
Course Learning Outcomes / ABET & PEOs relation	By the end of this course students will be able to: 1. Solve 1-phase and 3-phase circuits for current, voltage, and power. 2. Develop and solve the power transmission line models. 3. Develop and solve the load flow problem in electric power systems. 4. Develop and apply the synchronous machine circuit model to determine the impedance, efficiency, and voltage regulation using the EMF and MMF methods. 5. Develop and apply the 3-phase induction motor circuit model to determine the machine characteristics and performance measures. 6. Determine capacitor size to improve power factor (power factor correction). 7. Analyze the fault current (symmetrical fault) in a simple power system. 8. Develop and solve the power transformer circuit model to determine its characteristics and performance.
Tentative Topics	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

Homework Policy:

1. Homework will be assigned each week and is due in a week unless other instructions are given. The homework problems will be posted in Canvas. You need to scan and upload your answers to the assigned section in Canvas. It will be graded technically and overall quality.

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2. Students may discuss their homework solutions with one another, but each student must submit their own, independent solution (i.e. you may not just copy someone else's homework).
   - ✓ All homework should include a clear statement of the problem to be solved, indicating the known and unknown parameters. Engineering paper is preferred.
   - ✓ Number all equations, indicate and describe variable substitutions and mathematical procedure, and highlight (enclose, or box) your answers.
   - ✓ Always indicate appropriate units in answer and study them to determine if it is reasonable.

Quizzes:
There will be announced and unannounced quizzes during the semester to check your class activity and performance during the semester. They can be in groups or individually and are graded towards your final exam.

Exams:
1. Answer reflecting the solutions manual are not considered correct and will be turned in to the Dean of Students as copying.
2. Absolutely no cell phones, graphing calculators, laptops, iPads, iPods, smart watches, or any other smart technology devices are allowed in exams.
3. Make-ups for in-class exams for documented emergencies.
4. Exam grades will be returned, students will be allowed to view their exams, and the professor will keep original exams.
5. Any grade changes must be resolved no later than 24 hours after exam has been handed out. If you are absent, then it is your responsibility to meet with me to see your exam grade.

University Policies:

UT Tyler Honor Code
Every member of the UT Tyler community joins to embrace: Honor and integrity that will not allow me to lie, cheat, or steal, nor to accept the actions of those who do.

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

Campus Carry
We respect the right and privacy of students 21 and over who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at http://www.uttyler.edu/about/campus-carry/index.php

UT Tyler a Tobacco-Free University
All forms of tobacco will not be permitted on the UT Tyler main campus, branch campuses, and

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any property owned by UT Tyler. This applies to all members of the University community, including students, faculty, staff, University affiliates, contractors, and visitors.
Forms of tobacco not permitted include cigarettes, cigars, pipes, water pipes (hookah), bidis, kreteks, electronic cigarettes, smokeless
tobacco, snuff, chewing tobacco, and all other tobacco products.There are several cessation programs available to students looking to quit smoking, including counseling, guidelines, and group support.
For more information on cessation programs please visit www.uttyler.edu/tobacco-free.

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 of which students need to be aware. 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.

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Disability/Accessibility Services
In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA) the University of Texas at Tyler offers accommodations to students with learning, physical and/or psychological disabilities. If you have a disability, including a non-visible
diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or you have a history of modifications or accommodations in a previous educational environment, you are encouraged to visit https://hood.accessiblelearning.com/UTTyler and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with Cynthia Lowery, Assistant Director of Student Services/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at http://www.uttyler.edu/disabilityservices, the SAR office located in the University Center, # 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.

Student Standards of Academic Conduct
Disciplinary proceedings may be initiated against any student who engages in scholastic dishonesty, including, but not limited to, cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts.

i. "Cheating" includes, but is not limited to:
   - copying from another student's test paper.

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- using, during a test, materials not authorized by the person giving the test.
- failure to comply with instructions given by the person administering the test.
- possession during a test of materials which are not authorized by the person giving the test, such as class notes or specifically designed "crib notes". The presence of textbooks constitutes a violation if they have been specifically prohibited by the person administering the test.
- using, buying, stealing, transporting, or soliciting in whole or part the contents of an administered test, test key, homework solution, or computer program.
- collaborating with or seeking aid from another student during a test or other assignment without authority.
- discussing the contents of an examination with another student who will take the examination.
- divulging the contents of an examination, for the purpose of preserving questions for use by another, when the instructors has designated that the examination is not to be removed from the examination room or not to be returned or to be kept by the student;

- substituting for another person or permitting another person to substitute for oneself to take a course, a test, or any course-related assignment.
- paying or offering money or other valuable thing to, or coercing another person to obtain an administered test, test key, homework solution, or computer program or information about an administered test, test key, home solution or computer program.
- falsifying research data, laboratory reports, and/or other academic work offered for credit.
- taking, keeping, misplacing, or damaging the property of The University of Texas at Tyler, or of another, if the student knows or reasonably should know that an unfair academic advantage would be gained by such conduct; and
- misrepresenting facts, including providing false grades or resumes, for the purpose of obtaining an academic or financial benefit or injuring another student academically or financially.

ii. "Plagiarism" includes, but is not limited to, the appropriation, buying, receiving as a gift, or obtaining by any means another's work and the submission of it as one's own academic work offered for credit.

iii. "Collusion" includes, but is not limited to, the unauthorized collaboration with another person in preparing academic assignments offered for credit or collaboration with another person to commit a violation of any section of the rules on scholastic dishonesty.

iv. All written work that is submitted will be subject to review by plagiarism software.

UT Tyler Resources for Students

- UT Tyler Writing Center (903.565.5995), writingcenter@uttyler.edu
- UT Tyler Tutoring Center (903.565.5964), tutoring@uttyler.edu
- UT Tyler Counseling Center (903.566.7254)