

The University of Texas at Tyler
Department of Electrical Engineering

Course: EENG 5304 – Computer-Aided Power Systems Analysis

Syllabus

Catalog Description:

Modeling of electric power systems. Fault Analysis, symmetrical components, sequence networks, load flow, stability studies. Application of computer methods to power system analysis. Machine dynamics and transients in power system analysis. Three hours of lecture per week.

Prerequisites: EENG 4310 (or equivalent)

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

Text(s): No textbook required

Additional Material: Instructor's Lecture Notes, assigned readings

Course Coordinator: Hassan El-Kishky

Topics Covered: (paragraph of topics separated by semicolons)

Introduction to power systems
Transmission Lines Parameters
Power Transmission Line Models
Three-phase transformers
Synchronous Machine Models
Load Flow Analysis using Newton-Raphson
Symmetrical Components
Fault Analysis
Power System Steady-State and Transient Stability
Design of overhead power distribution lines

Evaluation Methods: (only items in dark print apply):

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

Course Objectives¹: By the end of this course students will be able to:

1. Solve 3-phase circuits for current, voltage, and power [1]
2. Determine power transmission line R, L, and C parameters [1,4]
3. Analyze and characterize power TL models [1,4]
4. Develop and characterize generator, transformer, and load models [1,4]
5. Develop and Solve the power flow using the Newton-Raphson method [1,4,5]

6. Develop symmetrical and unsymmetrical fault models in power system [1,4]
7. Solve symmetrical and unsymmetrical fault problems in power systems [1,4,5]
8. Solve simple transient stability problems in power system [1]
9. Solve simple protection problems in power systems [1]
10. Apply codes, standards, and best engineering practice [3,5,6]
11. Design a 3-phase high voltage overhead power distribution line [3,4,5,6]
12. Write and present a design report [12]

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. **Breadth and Depth:** Students will be able to apply knowledge at a graduate level in two of the following areas: electronics, power systems, controls, advanced engineering. [1-4]
2. **Modern Engineering Tools:** Students will be able to use modern engineering tools for analysis and design as applied to engineering problems. [5-6]
3. **Advanced Engineering Mathematics:** Students will be able to apply principles of advanced engineering mathematics including probability and statistics to engineering. [7-9]
4. **Systems Design:** Students will be able to apply systems design approaches including modeling and simulation of interacting sub-systems to complex engineering problems.
5. **Design Methods:** Students will be able to demonstrate application of design methodology by comparing and evaluating solutions to engineering problems.
6. **Communication Skills:** Students will demonstrate effective oral, visual and written communication skills from a technical perspective [10-12].

²Numbers in brackets refer to course 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

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01/03/2022

EENG 5304 Computer-Aided Power System Analysis

Spring 2022

Class Time: Online
Location:

Coordinator: Hassan El-Kishky, PhD, PE
Office: RBN 2004
Tel: (903) 565-5580 Fax: (903) 565-5877
Email: helkishky@uttyler.edu

Office Hours: 11:00-12:30 (via zoom) TTH
Other times by appointment

Textbook:

References: Glover, Sarma, Power System Analysis and Design, 5th ed., Thompson, 2012
Hindmarch, Electrical Machines and Their Applications, Pergamon Press, 1970.
Weedy, Power Systems Analysis, John Wiley and Sons, 1996
Grainger and Stevenson, Power System Analysis, McGraw-Hill, 1994.
MATLAB®
Published articles from selected journals and conference proceedings

Additional: Instructor's handouts
Materials

Software: MATLAB®, FORTRAN, or C

Contents:	Introduction to power systems	1 Week
	Power and Distribution Transformers connections	2 Week
	Synchronous machine models	1 Week
	Transmission Lines Parameters	2 ½ Week
	Power Transmission Line Models	1 Week
	Load Flow Analysis using Gauss Seidel	1 ½ Week
	Load Flow Analysis using Newton-Raphson	2 1/2 Week
	Symmetrical Components	1 Week
	Fault Analysis	2 Week
	Power System Transient Stability	1 Week

Prerequisite Graduate standing and at least one undergraduate course in power systems or COI

Grading:	Final Exam (Comprehensive)	25%
	Midterm Exam	20%
	Overhead distribution line project	40%
	Power Flow Project	5%
	Fault Analysis Project	5%
	Homework (up to 5 assignments)	5%

No late assignments are 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.