

EENG 4310
Electric Power Systems
Fall 2023
Syllabus

Instructor: Dr. Seyed Mahdi Ghamkhari

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Class Location: ENG 3212

Office Hours: Mondays 2:00 pm to 3:00 pm Faculty Suite – 3100 H

Prerequisites: EENG 3303

Course Description

Semester Credit Hours: 3 sch Magnetic circuits; principles of electromagnetic energy conversion; fundamentals of power systems modeling and design; power flow analysis.

Textbook

Stephan Chapman, “Electric Machinery and Power System Fundamentals”, McGraw-Hill Higher Education, 2001, ISBN: 978-0072291353

Note: The first edition of the textbook will be used in the course.

Link to purchase from Amazon

https://www.amazon.com/Electric-Machinery-Power-System-Fundamentals/dp/0072291354/ref=sr_1_1?keywords=978-0-07-229135-3&qid=1692207208&sr=8-1

Course Components

Assignments (Homework/Quizzes/Projects): 40%

Midterm Exam: 30%

Final Exam: 30%

Conversion of the numerical grade to letter grade

A: 90 – 100%

B: 80 – 89%

C: 70 – 79%

D: 60 – 69%

F: 0 – 59%

Note: Final grades will be rounded to the nearest whole number. For example, 81.5 or 81.6 would be rounded to 82, but 81.4 would be rounded to 81.

Dates

Last Day to Drop without Creating a Record: September/13th

Last Day to Drop or Withdraw: November/3rd

Guideline

- Students must have the required prerequisites of the course.
- Late submissions to the assignments are not accepted and a grade of zero will be allocated.
- Makeup exams will not be given to students who are absent from the exams.
- Canvas is the platform for course announcements and assignments.
- Announcements are made on Canvas.
- Assignments are posted on Canvas and students' responses to the assignments should be uploaded on Canvas.
- Students are highly recommended to configure their Canvas account so that they could be notified immediately once an announcement or assignment is posted.
- Students should communicate with the instructor using their UTPB Email address.
- Requests for re-grading must be received no later than one week following the return of the assignment.
- Students are encouraged to take notes from the materials presented in the class.

UTPB Student Conduct and Discipline

<https://www.utpb.edu/life-at-utpb/student-services/dean-of-students/student-conduct-and-discipline-utpb-revised-2020-final.pdf>

Attendance

Attendance in class is required.

Students with Disabilities

The University of Texas Permian Basin in compliance with the Americans with Disabilities Act and Section 504 of the Rehabilitation Act provides "reasonable accommodations" to students with disabilities. Only those students, who an instructor has received an official Letter of Accommodation (LOA) sent by the office of ADA for students, will be provided ADA academic accommodations.

ADA Office for Students

MR. Paul Leverington

Address: Mesa Building 4242, 4901 E. University, Odessa, Texas 79762

Phone: 4325524696

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Outline:

Week 1:	Power-Systems at a Glance
Week 2:	Electromagnetic fundamentals
Week 3-4:	Three-Phase Circuits
Week 5-6:	Transformers
Week 7:	Synchronous Machine
Week 8-9:	Transmission Lines

Week 10-11:	Power System Representation
Week 12-13:	Power Flow Analysis
Week 14-15:	Review

Topics:

1. Power-Systems at a Glance

The operation of power grids

2. Electromagnetic Fundamentals

Angular velocity

Magnetic field

Real and reactive power in AC circuits

3. Three-Phase Circuits

Voltage and currents in three-phase

Power relations in three phase circuits

Analysis of balanced three phase systems

One Line diagram

4. Transformers

The role of transformers in power grids

Ideal transformer

Theory of real single-phase transformer

The equivalent circuit of a transformer

The need for a per-unit system

Transformer taps and voltage regulation

Auto-Transformers

5. Synchronous Machines

Synchronous machines construction

The internal generated voltage of a synchronous generator

The equivalent circuit of a synchronous generator

The phasor diagram of a synchronous generator

Power and torque in synchronous generators

The synchronous generator operating alone

Synchronous motors

6. Transmission Lines

Inductance of the transmission lines

Capacitance of the transmission lines

Transmission lines models

Transmission lines characteristics

7. Power Systems Representations

One-line diagram

Per-phase, per-unit

8. Power Flow Analysis

Constructing admittance matrix

Power flow equations

Power flow studies

The information derived from power-flow studies

Disclaimer: The subject matter and dates for the course may evolve slightly and should be considered tentative. Updates will be announced.

Version

08/23/2023