WEST VIRGINIA UNIVERSITY

College of Engineering & Mineral Resources

Department of Computer Science & Electrical & Engineering

EE 335 ELECTROMECHANICAL ENERGY CONVERSION & ENERGY SYSTEMS
Fall 2014
3 Credit Hours

Instructor: Dr. M.A. Choudhry, 931 Engineering Sciences Building
.
Phone: 293-9685
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Office Hours: TR 10:00-11:00

Class Time: TR 12:30- 1345 Class Location: 801 ESB

Prerequisites: EE 223, EE 224, PHYS 112

Text: *Electric Machinery and Power System Fundamentals*, by Stephen J. Chapman, McGraw Hill.

Ref: *Electric Energy System*, by Syed A. Nasar, Prentice-Hall, Inc.

Objective: To acquaint the student with magnetic devices and principles of electromechanical energy conversion apparatus and power systems. By completion of the course, the student should be able to analyze and apply transformers, dc machines, induction motors, and synchronous machines and transmission lines in the steady-state. Students will utilize the latest software tool in a practical design.

Expected Learning Outcomes:

Be able to solve three-phase balanced circuits.
Be able to know voltage-current characteristics of different energy sources.
Be able to analyze magnetic circuits.
Be able to analyze circuits containing single-phase and three-phase transformers.
Be able to use force and torque equations in electromechanical systems.
Be able to calculate steady state values of current, voltage, torque, and power for dc machines.
Be able to calculate steady state values of current, voltage, torque, and power for synchronous machine.
Be able to calculate steady state values of current, voltage, torque, and power for induction motor.
Be able to calculate line parameters of three-phase transmission line.
Be able to draw impedance and reactance diagram on a common MVA base of power system.

Tentative Lecture Schedule:

Lecture	Subject	Topic
1.	Introduction	Class Policy

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		AC Steady-State Analysis Fundamentals of Electric Energy Systems
2.	Electric Energy Sources	Photovoltaic, Fuel Cells, Batteries, etc.
3.	Magnetic Circuits	B-H Relationship Magnetic Losses
4.		Analysis of Magnetic Circuits
5.	Transformers	Ideal
6.		Equivalent Circuit of Iron Core Trans.
7.		Analysis Examples Using Equiv. Circuit Phasor Diagram
8.		Polyphase Connections Auto Transformers
9.	Electromechanics	Energy Balance in Electromechanical System
10.		Force, Torque Equations & Applications
	Test # 1	
11.	DC Machines	Physical Description Armature Voltage
12.		Developed Torque Losses, Efficiency
13.		Name Plate Selected Example Problems
14.	Synchronous Machines	General Description, Revolving Field
15.		Performance of Round Rotor Generator
16.		Round Rotor Motor
17.		Parallel Operation
18.		Selected Example Problems
	Test # 2	
19.	Induction Motors	Phys. Description, Slip
20.		Equivalent Circuit, Approx. Equiv. Circuits
21.		Developed Torque
22.		Performance Calculations
23.		Nature of the Speed-Torque Curve
24.	Electric Energy Systems	Trans. Line Parameters
25.		Trans. Line Representation
26.		Trans. Line as a Two-port Network
27.		The One-Line Diagram
28.		Impedance and Reactance Diagram

Final Exam is on

Grading Policy:

Homework	10%
Software Simulation	10%
2 Tests	55%
Final Exam	25%
	100%

Unless the performance or circumstances associated with a particular student indicate otherwise, the final grade in the course will be based on the exam average according to the following scale:

A	90 - 100
B	80 - 89
C	70 - 79
D	60 - 69
E	59 ↓

Attendance Policy:

Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.

Academic Integrity Statement:

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at http://www.arc.wvu.edu/admissions/integrity.html. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me *before* the assignment is due to discuss the matter.

Social Justice Statement :

WVU is committed to social justice. The instructor of this course concurs with WVU's commitment and expects to maintain a positive learning environment based upon open communication and mutual respect and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration.
If you are a person with disability and anticipate needing any type of accommodation in order to participate in this class, please advise us and make appropriate arrangements with Disability Services (293-6700).