Fall 2015

ENEE 3522

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University of New Orleans

Department of Electrical Engineering
The University of New Orleans

ENEE 3522 – **Electrical Power Systems**

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ENEE 3522 Electrical Power Systems **3 cr.**

Introduction to industrial and utilities electric power systems, poly-phase systems, fault conditions, per-unit values, and the method of symmetrical components. Students are expected to have taken *Electric Circuits* and have some knowledge of MATLAB.

PREREQUISITE: *ENEE 2551 Circuits II*.

TEXTBOOK AND OTHER MATERIALS:
A. R. Bergen and V. Vittal, *Power System Analysis*, 2nd edition, Prentice Hall, 2000.

Optional Reference
J. J. Grainger, *Power System Analysis*, 1st edition, McGraw- Hill, 1994.
A.E. Fitzgerald, C. Kingsley, S.D. Umans, *Electric Machinery*, 7th edition, McGraw-Hill, 2013.

CLASS SCHEDULE: Monday and Wednesday, 3:30pm-4:45pm, Room EN321.

INSTRUCTOR: Ittiphong Leevongwat, Ph.D.
Associate Professor
E-mail: ileevong@uno.edu
Phone: (504) 280-7381
Office: EN838
Office Hours: Monday and Wednesday 2:00-3:30pm (or by appointment)

STUDENT LEARNING OBJECTIVES
After successfully completing this course each student will be able to:
1. Understand basics of electric energy system theory.
2. Perform per-unit calculations and analyze balanced three-phase power systems.
3. Derive the circuit modeling of synchronous generators.
4. Derive the circuit modeling of transformers and understand their three-phase connections.
5. Understand transmission-line parameters and transmission-line modeling.
6. Understand the basic concept of short-circuit faults

COURSE TOPICS:
1. Introduction to electrical power systems
2. Complex power; Balanced three phase
3. Synchronous generator modeling

4. Transformer modeling; Per Unit System
5. Transmission-line parameters and transmission-line modeling
6. Short circuit faults; The method of symmetrical components

TENTATIVE SCHEDULE:

Week 1 (Aug 19):	Introduction to electrical power systems
Week 2 (Aug 24, 26):	Complex power, One-line diagram, Balanced three phase
Week 3 (Aug 31, Sep 2):	Per-phase analysis, Per-unit calculations
Week 4 (Sep 9):	**[*Labor Day: Sep 7*]**, Per-unit calculations
Week 5 (Sep 14, 16):	Introduction to synchronous generators
Week 6 (Sep 21, 23):	***Test #1,*** Synchronous-generator circuit modeling
Week 7 (Sep 28, 30):	Power angle characteristic
Week 8 (Oct 5, 7):	Transformer circuit modeling
Week 9 (Oct 12, 14):	Transformers in three-phase environments
	<Final date to drop: Oct 14>
	<Mid-semester break: Oct 15-16>
Week 10 (Oct 19, 21):	Normal system, Per-unit impedance diagram
Week 11 (Oct 26, 28):	***Test #2,*** Transmission-line parameters
Week 12 (Nov 2, 4):	Transmission line inductance
Week 13 (Nov 9, 11):	Transmission line capacitance
Week 14 (Nov 16, 18):	Transmission-line models
Week 15 (Nov 23, 25):	Short circuit faults, Method of symmetrical components
	<Thanksgiving Nov. 26-27>
Week 16 (Nov 30, Dec 2):	***Test #3,*** Method of symmetrical components
Week 17 (Dec 9):	***Final Exam*** (Wednesday, 3:00pm-5:00pm)

COMPUTER USAGE: Use of computer software such as Matlab, and/or other engineering analysis programs will be used in homework assignments.

SUPPLEMENTARY MATERIALS: Will be given in class or posted on Moodle.

GRADING POLICY: (1) Homework Assignments (5%)

(2) Three Tests, 20% each (60%)

(3) Final Exam (35%)

Letter grades will be assigned according to the guidelines:

A: 90-100, B: 80-89, C: 70-79, D: 60-69, F: <60

ATTENDANCE: Instructors will take student attendance on a regular basis to monitor students' participation and progress in the class. Excused absence needs to be in writing and shall be emailed to your instructor and department chair.

STUDENT CONDUCT: Please respect your classmates and your instructor by avoiding disruptive behavior during class, such as habitually coming to class late, maintain steady conversation with neighbors during lecture, and making/taking calls on your cell phone.

Academic Integrity

Academic integrity is fundamental to the process of learning and evaluating academic performance. Academic dishonesty will not be tolerated. Academic dishonesty includes, but is not limited to, the following: cheating, plagiarism, tampering with academic records and examinations, falsifying identity, and being an accessory to acts of academic dishonesty. Refer to the Student Code of Conduct for further information. The Code is available online at http://www.studentaffairs.uno.edu.

Accommodations for Students with Disabilities

It is University policy to provide, on a flexible and individualized basis, reasonable accommodations to students who have disabilities that may affect their ability to participate in course activities or to meet course requirements. Students with disabilities should contact the Office of Disability Services as well as their instructors to discuss their individual needs for accommodations. For more information, please go to http://www.ods.uno.edu.

RELATIONSHIP OF THE COURSE TO PROGRAM OUTCOMES

X	**a. an ability to apply knowledge of mathematics, science, and engineering**		g. ability to communicate effectively
X	**b. an ability to design and conduct experiments, analyze and interpret data**		h. understand the impact of engineering solutions in a global and societal context
X	**c. ability to design a system, component, or process to meet desired needs**		i. recognition of the need for, and ability to engage in life-long learning
	d. ability to function on multi-disciplinary teams		j. knowledge of contemporary issues
X	**e. ability to identify, formulate, and solve engineering problems**	X	**k. ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.**
	f. understanding of professional and ethical responsibility		

Authored by Dr. Ittiphong Leevongwat, August 2015.