

EE332 Introduction to Power Systems Engineering I (4 credits (3+1P))
College of Engineering, New Mexico State University
Klipsch School of Electrical and Computer Engineering
FALL 2008

Date and Time:

Class MWF 8:30AM-9:20 AM

Laboratory: Section A B W 2:30-5:00

Section C D Th 1:10-3:40

Room: Class T&B204 Lab-Computer(C) 202 Lab-Machinery (M) – 100B

Instructor: Satish J. Ranade

Office Hours: T&B112 MW 2:30PM- 4 PM, or by appointment

Phone: 505 646 3704

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Internet: <http://www.ece.nmsu.edu/~sranade>

Course Description from the Undergraduate Course Catalog –

EE332 Introduction to Power Systems Engineering I 4 cr.(3+3P) Introduction to the principles, concepts, and analysis of major components of an electric power system. Material includes basic electro-mechanics, transformers, ac machines, transmission lines and system analysis.

Prerequisite: C or better in EE211, EE161

Textbook and other Required Materials: Glover/Sarma/Overbye “Power Systems Analysis and Design”, 4th Ed., Thompson, NY, 2008. ISBN 10: 0-534-54884-9

Calculator Policy: The Klipsch School Calculator Policy applies to quizzes and tests. Any changes to this rule will be announced in class. <http://www.ece.nmsu.edu/Calculators.htm>

Special Note:

1. Classes scheduled for 9/3, 9/8 and 9/17 may be canceled with short notice because of possible Jury duty
2. This semester we will be modifying course content to move towards the new curriculum where this class will be listed as EE391.

Tests: Tests 1 and 2 will be scheduled from 6-8 PM on the dates indicated. Please contact the instructor if there is a conflict.

Course Objectives:



1. To introduce students to the basic structure and requirements of any electric power supply system and the nature of power systems engineering and the profession. To establish background for further studies in power systems
2. To develop an understanding of components in a power system and to understand the basic electromagnetic and electromechanical principles involved in these components.
3. To develop an understanding of the physical-principles—to-electric-equivalent circuit approach to the analysis and design of components and systems.
4. To develop skills in equivalent circuit based analysis techniques building upon competencies developed in prior coursework.
5. To explore analysis and design principles for the complete power system
6. To understand measurement, analysis, simulation and design techniques, through laboratory exercises involving hardware and software.

Relationship of Course to Program Outcomes

Course Objective	Program Outcome									
	I b	Ic	II e	II f	III a	III b	IIIc	IIIe	IIIj	IIIk
1		x							x	
2				X	x		x	x		x
3				X	x			x		
4				X	x			x		x
5	X		x	X	x				x	x
6(Lab)	X			X	x	x	x	x		x

Relevant Program Outcomes

- | | |
|--|--|
| I b. Use of computers | IIIc. Ability to design system or components |
| Ic. Explore Specialties | |
| II e. Knowledge of advanced mathematics. | IIIe Identify, Formulate, Solve |
| II f. Knowledge of engineering sciences. | IIIj. Contemporary Issues |
| III a. Ability to apply knowledge of mathematics, science and engineering. | III k. Use of engineering tools. |
| IIIb. Ability to design and conduct Experiment/analyze data | |

Contribution of EE 332 to Meeting the Professional Component:

This course continues to build the foundation for the electrical engineering curriculum. In this class, students will learn analytical techniques and tools, which will be used in many subsequent classes and their engineering careers. In the laboratory part they will have further opportunity to apply concepts learned in the classroom, practice using tools, and continue to learn to work in a team setting.

Relationship of the Course to Program Objectives:

The educational program objectives of the Department of Electrical and Computer Engineering are to provide students the broad educational background and skills necessary for a successful, fulfilling and life long career in electrical and computer engineering. To assist in supporting these objectives, EE 332 provides the students a solid introduction to electric power supply concepts. Modeling and analysis techniques developed provide a basis for other classes as well as their continued development as electrical engineers. Students are also exposed to a future area of specialization that provides meaningful challenges and career opportunities. Through the use of our laboratory, students learn to work with higher voltage rotating equipment, and related safe laboratory practices; students will be exposed to standard simulation tools as well as experimental application of concepts. The students learn to work together and learn from each other as they work on various homework and lab problems.

STUDENTS WITH DISABILITIES: If you have (or believe you have) a disability and would benefit from classroom accommodation(s), please contact the Services for Students with Disabilities (SSD)]

Student Responsibilities:

1. Register with SSD and obtain accommodation documents early in the semester;
2. Deliver the completed accommodation and testing form(s) to the instructor(s) within the first two weeks of beginning of classes (or within one week of the date services are to commence);
3. Retrieve the signed form(s) from faculty and return to SSD within (5) days of the receipt from faculty and at least one week before any scheduled exam; and,
4. Contact the SSD Office if the services/accommodations requested are not being provided, not meeting your needs, or if additional accommodations are needed. Do not wait until you receive a failing grade. Retroactive accommodations cannot be considered.

Faculty Responsibilities

1. Sign the *ACCOMMODATION REQUEST FORM* and *TESTING ACCOMMODATION FORM* (when presented), retain a copy, and return the original to the student within five (5) working days of receipt;
2. Contact SSD immediately if there are any questions or disputes regarding accommodation(s), disruptive behavior, etc.; and,
3. Refer the student to SSD for any additional accommodations.

Accommodations: SSD Office, 646-6840 (Corbett Center, room 244)

Discrimination: Office for Institutional Equity, 646-3635, O’Loughlin House

Tentative Schedule

Week	Topic	Section	Lab A,C	Lab B,D
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1(8/22)	Introduction to Power Systems Engineering	Ch. 1		
2(8/25)	Tools Single and Three Phase Circuit Calculations	Ch. 2 2.1-2.3	C 1 M1	M1 C1
3(9/1)	Labor Day Sept. 1			
4(9/8)	Tools: Single and Three Phase Circuit Calculations(Continued)	Ch. 2 2.5-2.7	TBD	TBD
5(9/15)	Tools : Magnetostatics	Notes		
6(9/22)	Energy Sources and Conversion	Notes	C2	M2
7(9/29)	No regular class 9/29 <i>Test 1 9/29 6 PM</i> The Synchronous Generator	Notes	M2	C2
8(10/6)	The Synchronous Generator	Notes	C3	M3
9(10/13)	Photovoltaics and Wind Power Delivery Transformers	Notes 3.1-3.2	M3	C3
10(10/20)	Transformers	3.7, 3.4, 3.3	C4	M4
11(10/27)	Transmission Lines <i>Test 2 10/27 6 PM</i>	4.1-4.5, 4.8-4.9	M4	C4
12(11/3)	Transmission Lines	Ch.6.4-6.11	C5	M5
13(11/10)	Power Systems Power Flow Studies		M5	C5
14(11/17)	Power Conversion	Notes	C6	M6
15(12/1)	Thanksgiving Rectifiers Switching Converters		M6	C6
15(12/8)	<i>Test 3 12/12 8AM</i> <i>Optional Comprehensive Makeup 12/12 9 AM</i>			

LABORATORY



Computer(Software) Based Experiments:

- C1 Mathcad #1 Introduction to Mathcad
- C2 Mathcad # 2 Solving circuit problems using Mathcad
- C3 C Program Solving circuit problem
- C4 Arroyo Substation Tour
- C5 Power World I Introduction to Power Flow Analysis
- C6 Power World II Application of Power Flow Studies

Machinery (Hardware) Based Experiment

- M1 Measurements
- M2 Inductors
- M3 Synchronous Generator
- M4 Transformer
- M5 Power Systems
- M6 Power electronics

Labs will begin the week of August 25, 2008.

Each Laboratory Session will involve the following:

1. Laboratory Lecture/Quiz/Preparation Time (45 min)
2. Laboratory exercise (100 min)
3. Homework help as needed

GRADING

Course grade will be computed from the weighted average of class (3 cr.) and laboratory (1 cr.) grades. You must have a passing grade ($\geq 60\%$) in each; otherwise a course grade of F will be assigned.

Class	80%	Homework	20 %
		Pop Quizzes (10 minutes each)	20 %
		Tests 3	60 %
Laboratory	20%		

Course grade: A $\geq 90\%$, B $\geq 80\%$, C $\geq 70\%$; D $\geq 60\%$; F $< 60\%$

Extra Credit: 1/2 point will be added to your semester total for any of the following activities:

- A. *Active* participation in professional societies or campus clubs engaged in service; give me a one page report describing your role(s)
- B. Attend seminars related to electrical engineering and write a one-page report summarizing the seminar within one week of the seminar date..
- C. Write 5-page report on the topics listed on the course web-page. Watch due dates!

Maximum extra credit is 5 points—enough to change a B+ to an A!

POLICIES



1. Homework is assigned every day and collected on Friday and Fridays. I encourage you to collaborate on homework and to use a tool such as Mathcad.
2. Late Homework Will not be accepted.
3. Tests will focus on the material studied in each preceding period.
4. All work on tests and quizzes must be your own.
 - You are allowed two-sides of a 8.5x11 cheat sheet for formulas for tests and quizzes.
 - Do not put solved examples on the cheat sheet. If you do, you will receive a zero on the test.
 - Turn cheat sheet in with test.
5. Makeup tests can be given if you have a medical excuse, or if you need to miss class for good reason and make arrangements ahead of time
6. There will be no makeup quizzes. If you miss a quiz for valid reason I will compute the quiz average based on the number of quizzes actually taken
7. Arrangements can be made for makeup laboratory sessions if you have a valid reason (medical, family, out-of-town).
8. Grade scores and averages will be posted periodically and available from me at any time. Incomplete grades will be assigned only under exceptional circumstances (e.g., medical, family), with proper and timely documentation, and only if you have a passing grade at mid-semester. Per NMSU rules an Incomplete cannot be given to avoid a bad or failing grade.
9. **Failure to follow safety and other specified procedures in laboratory will result in an F grade for the course**
10. Please treat TAs with respect – if a concern cannot be resolved come talk to me.

The Easy 'A'

Come to class, ask questions – at least most of the time anyway
Voice any Concerns

Do Homework
DO HOMEWORK
DO HOMEWORK

Read the book
Read the book

Make a good cheat sheet with fundamentals and tricky formulas.
Think

Enjoy