

# COURSE SYLLABUS

## EE 340: Introduction to Electrical Power Engineering

### Spring 2012

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**Required Book:** S.J. Chapman, *Electric Machinery and Power System Fundamentals*, McGraw-Hill, ISBN 0-07-229135-4

#### **Other Recommended Books:**

1. Electric Machines and Power Systems, Del Toro, Prentice Hall, 1985.
2. Electric Machinery, A.E. Fitzgerald, C. Kingsley, Jr., and S.D. Umans, McGraw-Hill, 1990.
3. Electromechanical Energy Devices and Power Systems, Z.A. Yamayee and L.L. Bala, John Wiley & Sons, 1994.
4. Electric Energy Conversion and Transmission, S.A. Nasar, Macmillan Publishing Co., 1985
5. Power System Analysis, C.A. Gross, John Wiley, 1990
6. Power System Analysis and Design, J.D. Glover and M.S. Sarma, Thomson Learning, 2002.

#### **Pre- and Co-requisites:**

Corequisite: EE 330 (Formerly EEG 430).

Prerequisites: EE 320 (Formerly EEG 308).

#### **Course Objectives:**

- Calculate various powers and correct the power factor in 1-phase and 3-phase power circuits,
- Derive the efficiency, voltage regulation, electrical parameters, and loading on power transformers,
- Synchronous generator electrical characteristics including synchronization and control of power,
- The electromechanical characteristics of 3-phase induction motors.
- Types of power lines and how to determine their electrical parameters, and voltage regulation and efficiency under load, and loading limits
- Learn basic techniques for power flow studies
- Calculate symmetrical and unsymmetrical fault currents.
- Solve basic economic dispatching of electrical generators

- Utilize software to conduct power flow and fault calculations in complex power systems.

**Course Outcomes:**

Students should be able to

- Calculate real, reactive and apparent power, and power factor of given electrical loads, and determine appropriate capacitor size for desired power factor correction,
- Analyze three-phase circuits, and derive balancing and compensator elements for unbalanced loads.
- Determine the circuit parameters of power transformers, calculate their efficiency and voltage drop under various loads
- Determine the circuit parameters of transmission lines, and means of controlling real and reactive power flow as well as line compensation and limitations.
- Determine the equivalent circuit parameters of synchronous machines, synchronize these machines to a power system, and control the active and reactive power generation.
- Have an understanding of the workings of three-phase induction motors in terms of equivalent circuit parameters and torque-speed curves.
- Derive the Y-bus matrix and power flow equations of a given network and perform such a study using a software package.
- Derive the short-circuit equations of a given network and perform such a study using a software package.
- Solve basic economic dispatch problems.

**Computer Usage:**

PSpice, EasyPower, Matlab

**Tests:**

	<b>Subject</b>	<b>Value</b>
Test 1	Fundamentals, Transformers, synchronous generators	20 Pts
Test 2	Induction motors, Transmission lines	20 Pts
Test 3	Power system representation., power flow, fault calculations, economic dispatch	20 Pts
Quizzes	15 min each – once a week	30 Pts
Final	Covers all course material	30 Pts
<b>Total</b>		<b>120 Points</b>

**Grading:**

A ≥ 100 > B ≥ 80 > C ≥ 60 > D ≥ 50 > F

**Notes:**

- Homework will be assigned but not collected. Everyone is highly encouraged to do the assigned homework problems as some of the test problems will be similar to these.
- There will be no make-up tests or quizzes.
- There will be no extra credit work for individuals.
- Class attendance and participation is highly encouraged.

**Academic Misconduct** – Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility and professionalism. By choosing to join the UNLV community, students accept the expectations of the Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling in UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

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UNLV complies with the provisions set forth in Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990. The DRC is located in the Student Services Complex (SSC-A), Room 143, phone (702) 895-0866, fax (702) 895-0651. For additional information, please visit: <http://drc.unlv.edu/>.

**Religious Holidays Policy** – Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to the religious holiday absence only. It shall be the responsibility of the student to notify the instructor no later than the first two weeks of classes of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. This policy shall not apply in the event that administering the test or examination at an alternate time would impose an undue hardship on the instructor or the university which could have been avoided. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=4&navoid=164>.

**Tutoring** – The Academic Success Center (ASC) provides tutoring and academic assistance for all UNLV students taking UNLV courses. Students are encouraged to stop by the ASC to learn more about subjects offered, tutoring times and other academic resources. The ASC is located

across from the Student Services Complex, #22 on the current UNLV map. Students may learn more about tutoring services by calling (702) 895-3177 or visiting the tutoring web site at: <http://academicsuccess.unlv.edu/tutoring/>.

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**Rebelmail** – By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always [@unlv.nevada.edu](mailto:@unlv.nevada.edu).