ELEN 3441 Fundamentals of Power Engineering  
Spring Semester 2014

Catalog Description: Review of electro-mechanics and three phase circuit analysis. Principles of electromechanical energy conversion and energy delivery; operation of transformers, DC machines, synchronous machines, induction machines. Introduction to electric motor drives, power electronics and power network models. The per unit system. Newton-Raphson power flow. Symmetrical three phase faults. The laboratory includes the operation, analysis, and performance of transformers, motors, and generators.

Prerequisites:  
By course: ELEN 3312 Circuits II and ELEN 3371 Electromagnetics I with grade of C or better.  
By topic: DC and AC circuits; calculus based physics in electricity and magnetism; analytic geometry and calculus and vector analysis.

Meetings:  
Lectures: MWF 12:40-13:35; Room 2631C  
Labs: W 2:00-5:00; Room 1403 C  
Instructor: Gleb V. Tcheslavski

Office hours: by appointment; Room 2030


Recommended books:  


On-line access: The course syllabus, assignments, solutions, and supplementary materials will be available through http://www.ee.lamar.edu/gleb/power/Index.htm.

Structure: Three 55-minute lectures per week, one laboratory exercise per week, five to eight homework assignments, two midterm exams, and the final examination.

Objectives (with corresponding ABET Criteria/outcomes): Having successfully completed this course, the student will be able to:

- Convert between the English system and the SI system of units. (Criterion 3(a))
- Learn the fundamentals of mechanical and electrical energy transfer especially for rotational machines. (Criterion 3(a),(c))
- Understand how three-phase AC power is generated, the advantages of three-phase systems, and the advantages and disadvantages of various three-phase connections. Be able to recognize three-phase power distribution and transmission systems. (Criterion 3(a))
- Become aware of the importance of transformer systems and learn about the various types of transformers and their characteristics. (Criterion 3(a),(c))
• Learn the characteristics and applications of various types of DC and AC motors and generators and garner an appreciation for their principle advantages and disadvantages. (Criterion 3(a),(c))
• Learn the characteristics and applications of power transmission lines and develop skills in power-flow analysis. (Criterion 3(a),(c))
• Recognize electric distribution and transmission systems in the field and acquire an appreciation for the differences in the needs that they supply. (Criterion 3(c))
• Obtain hand-on experience operating DC and AC electric motors and generators, which includes their appropriate wiring and experimental determination of their characteristics. (Criterion 3(b),(h),(j),(k))
• Attain a respect for electric power systems and machinery and acquire a consciousness for safety for themselves and other people when working with and around electric machines and power systems. (Criterion 3(f),(g),(h))

Tentative topics to be covered (approximate number of 75-minute class periods):

• Electro-mechanical fundamentals. (4)
• Three-phase power circuits: Generation, Distribution, and Loading. (4)
• Transformers. (2)
• DC machines: characteristics of series and shunt wound types. (2)
• AC machinery fundamentals. (2)
• Synchronous machines. (2)
• Induction machines. (2)
• Transmission lines. (2)
• Power-Flow Studies. (7)
• Midterm and final exams (3)

Tentative laboratory exercises:

• Lab safety and Lab-Volt overview.
• Serial, parallel, and serial-parallel connections of resistors and capacitors.
• Impedance.
• 3-phase circuits.
• Single-phase transformer
• 3-phase transformer.
• DC motors.
• DC generators.
• Synchronous motor.
• Split-phase induction motor.
• Capacitor-start and capacitor-run motors.
• Universal motor.
• Wound rotor induction motor.
• 3-phase alternator.
• Transmission line.
• ETAP introduction.

IT IS YOUR RESPONSIBILITY TO ACHIEVE THE COURSE OBJECTIVES. IT IS AS MY TASK TO FACILITATE YOUR ACHIEVEMENT.
Tests: The MIDTERM (MT) and the FINAL EXAM will be closed book/notes, no transmitting devices.

Final exam: TBD

Grading Policy Grades will be determined on the basis of overall performance on the midterm exam, the final exam, laboratory reports, and homework assignments, with the following tentative weights:

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<tr>
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<th>Homework</th>
<th>Midterm</th>
<th>Laboratory</th>
<th>Final</th>
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<tbody>
<tr>
<td>Weight</td>
<td>20%</td>
<td>10% + 15%</td>
<td>30%</td>
<td>25%</td>
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Homework: Homework assignments will be due one week after they have been assigned before the class time. No late reports will be accepted.

Laboratory reports: Laboratory reports are due one week after the lab before the next lab exercise. No late reports will be accepted.

Attendance policy: Class, Exam, and Laboratory attendance is mandatory. You must notify your instructor about your absence and present appropriate documents. Missing more than two labs may result in receiving a failing grade for the class.

Students with Disability statement

Any students with disabilities are advised to contact the professor privately to discuss your special needs. Students with disabilities should also contact the Services for Students with Disabilities by email SFSWD@lamar.edu, phone 409-880-8347, or visit the office in the Communication Building Room 105 to coordinate reasonable accommodations for students with documented disabilities.

Academic Dishonesty:

Academic misconduct and dishonesty include copying, cheating, plagiarism, dual submission and items purchased with the intent of deception (i.e. term papers purchased on the internet). Students are expected to do original work, including class assignments, exams and labs. Penalties include failure of the assignment (a grade of zero) and possible stricter penalties, where appropriate. Such action could result in the failure of the course or suspension from the university. Refer to Student Handbook of Lamar University for clarification on Academic dishonesty.