Tentative Course Outline

Instructor: Dr. Walid Hubbi
Office: ECE 329
Office Hours: Mondays and Fridays 10:00-11:00

Outline by Topics: Because a textbook is not assigned but rather freely available learning resources will be used, a weekly schedule is not followed. The outline specifies topics to be covered and approximate weeks needed to cover them.

<table>
<thead>
<tr>
<th>Dates (M = Monday, R=Thursday.)</th>
<th>Topics</th>
<th>Weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review of Basics, complex numbers, phasors, Complex Power, Three-Phase. Basic principles of motor and generator actions, real power, apparent power.</td>
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<tr>
<td>Magnetic Fields and Magnetic circuits</td>
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<td>Ideal transformer, theory, excitation current. Practical transformer, equivalent circuit, three-phase transformer, transformer ratings</td>
<td>1.5</td>
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<td>M. 10/16</td>
<td>Test I (40 points)</td>
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<tr>
<td>10/19 and 10/23</td>
<td>rotating magnetic field</td>
<td>1</td>
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<tr>
<td>AC generators and motors, Construction of Three-Phase Synchronous Machines. Synchronous Generators, Synchronous Motors, Equivalent Circuit Model Power and Torque Characteristics.</td>
<td>3.5</td>
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<tr>
<td>M. 11/20</td>
<td>Test II (40 points)</td>
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<tr>
<td>M. 11/21 and M. 11/27</td>
<td>Induction motors, Equivalent Circuits, Efficiency.</td>
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<tr>
<td>DC machines</td>
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<td>2</td>
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Catalog Description:

ECE 341 - Energy Conversion (3-0-3)

Prerequisites: ECE 231
This course covers fundamental concepts of Magnetic circuits and their applications, and the steady-state performance of dc and ac electromechanical energy converters.

Grading Policy: Maximum points is 150 points divided as follows: two tests 40 points each; homework and class performance 20 points; and final 50 points. Homework is due on Thursdays unless otherwise notified. Please use the standard cover sheet at the end of this outline as the first page of your HW. You can use the cover sheet to write your solutions. The letter grade will be as follows: A>90%, B+>80%, B>70%, C+>60%, C>50%.

Time Requirements: On the average, a full-time student during the Fall or Spring semester takes courses having a total of 15 credits and study about 45 hours/week. This is equivalent to 2 hours of study for every hour in class. Therefore, you are expected to allocate 9 hours/week for this course (including time spent in class).

Other Policies

1. Students should be familiar with NJIT Honor Code. This code will be rigorously upheld, any violations will be brought to the immediate attention of the administration.
2. Students are expected to read the selected text prior to each lecture period. Students will be informed of the selected texts in due course.
3. Students are expected to complete the assigned homework problems after each lecture period.
4. Regular class attendance is expected.
5. T and expected to allocate 45 hours for academic work per week

Assumed Knowledge

- complex number representation and arithmetic,

To practice operations on complex numbers you can download a Matlab program to test your ability in dealing with complex numbers. Go to http://www.utdallas.edu/~raja1/EE%203302%20Fall%202015/GaTech/zdrill/help/

You need to download ZDrill to a location where MATLAB can find it. To use this program, type zdrill at the Matlab prompt “>>”.

• basic DC and sinusoidal steady-state AC electrical circuit analysis: eg. Ohm’s law, Kirchhoff’s Voltage Law, Kirchhoff’s Current Law, phasor representation of sinusoidal AC signals, series and parallel impedances, Thevenin's theorem,
• concept of complex, real and reactive power, power triangle (Circuits and Systems I),
• basic Physics, Ampere's law, Faraday's law.

ABET General Criteria 3. Student Outcomes

• Student Outcomes -- Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge and behaviors that students acquire as they progress through the program. The following are the Student Outcomes specified by ABET (Accreditation Board for Engineering and Technology):
  (a) an ability to apply knowledge of mathematics, science, and engineering
  (b) an ability to design and conduct experiments, as well as to analyze and interpret data
  (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
  (d) an ability to function on multidisciplinary teams
  (e) an ability to identify, formulate, and solve engineering problems
  (f) an understanding of professional and ethical responsibility
  (g) an ability to communicate effectively
  (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
  (i) a recognition of the need for, and an ability to engage in life-long learning
  (j) a knowledge of contemporary issues
  (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcomes and how they Relates to Student Outcomes

1. Students learn three-phase circuit analysis (a,e,k)
2. Students learn some fundamental laws of electromagnetism (Faraday’s and Ampere’s Laws) and their application in the analysis and design of simple energy conversion devices and transformers (a, c, e).
3. Students learn fundamentals of magnetic circuits and application to machine design (a, c, e).
4. Students learn fundamentals of electromechanical energy conversion (a, e).
5. Students learn fundamentals of direct-current generators and motors (a, e).
6. Students learn the fundamentals of alternating-current generators and motors (a, e).
7. Students learn the importance of energy conversion to society (f, h, j).
8. Students use Matlab to solve engineering problems (a, e, k).