University of Toronto  
Edward S. Rogers Sr. Dept. of Electrical & Computer Engineering  

**ECE314: Fundamental of Electrical Energy System**  
Fall 2016  
Course Management Form  

**Instructor**  
- Hamid S. Timorabadi, P. Eng.  
- Email: h.timorabadi@utoronto.ca  

**Criteria for Emails:**  
- Subject area of the email should include “ECE314” and an intention, e.g.  
  - ECE314: Missing mark  

- Office: SF1023E  
- Office Hour: Fridays, 11AM-Noon  

**Lectures**  
- Tuesdays, Thursdays, and Fridays: Noon – 1PM, GB221  

**Tutorials (Starts September 13, then every week)**  
- TUT0101: Tuesdays 10-11AM, GB2145  
- TUT0102: Tuesdays 11AM-Noon, GB2145  

**Labs (Location is GB40)**  
- PRA0101: Wed. 3-6PM, Starts on Oct. 05, then alternating weeks  
- PRA0102: Wed. 3-6PM, Starts on Sept. 28, then alternating weeks  
- PRA0103: Wed. 9AM-Noon, Starts on Oct. 05, then alternating weeks  
- PRA0104: Wed. 9AM-Noon, Starts on Sept. 28, then alternating weeks  
- PRA0105: Th. 3-6PM, Starts on Oct. 06, then alternating weeks  
- PRA0106: Th. 3-6PM, Starts on Sept. 29, then alternating weeks  

**Important:** A hand out for each lab will be posted in advance on the course website. All labs (except for the Introductory Lab) include a graded lab prep. In the interest of fairness, all lab preps for all students must be turned in before the deadlines provided in the table below. Late submissions will receive a mark of zero.  

<table>
<thead>
<tr>
<th>Experiment #</th>
<th>Prep is due</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Before 11AM on Tuesday October 11</td>
</tr>
<tr>
<td>2</td>
<td>Before 3PM on Monday October 24</td>
</tr>
<tr>
<td>3</td>
<td>Before 3PM on Monday November 07</td>
</tr>
<tr>
<td>4</td>
<td>Before 3PM on Monday November 21</td>
</tr>
</tbody>
</table>

**Course description in the calendar**  
- This course is intended to provide students with an understanding of the principles of operation, modeling, and analysis of electric energy conversion devices (a more detailed list of learning objectives is provided at the end of this document). This course primarily relies on linear circuit analysis concepts (ECE159 or equivalent).
Textbook
1. Course packet for ECE314, will be available after September 09 from Alicos (next to Starbucks on the College Street), consisting of the following textbook excerpts:
   - P. Krein, Elements of Power Electronics, Oxford Press, 1998, Chapter 6 and Appendix A.

Outline
- Note that the following outline is tentative and in general the lecture notes provide a detailed description of the course materials.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Lecture(s)</th>
<th>Text Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction and logistics</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Analysis of dc/dc converters</td>
<td>2-6</td>
<td>Erickson: §2.1-2.5</td>
</tr>
<tr>
<td>Steady-state equivalent models of dc/dc converters</td>
<td>7-9</td>
<td>Erickson: §3.1-3.5</td>
</tr>
<tr>
<td>Switch realization and switching losses</td>
<td>10-12</td>
<td>Erickson: §4.1, 4.3.1</td>
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<tr>
<td>Continuous/discontinuous conduction mode boundary</td>
<td>13</td>
<td>Erickson: §5.1</td>
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<tr>
<td>Analysis of periodic signals (Fourier series, rms, factor, distortion)</td>
<td>14-16</td>
<td>Erickson: §16.1-16.3</td>
</tr>
<tr>
<td>Dc/ac conversion (square wave, PWM)</td>
<td>17-21</td>
<td>Krein: §6.1-6.4</td>
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<tr>
<td>Magnetic circuits, inductance, magnetic materials</td>
<td>22-24</td>
<td>Fitzgerald: §1.1-1.5</td>
</tr>
<tr>
<td>Transformers (ideal &amp; non-ideal)</td>
<td>25-29</td>
<td>Fitzgerald: §2.1-2.6</td>
</tr>
<tr>
<td>Electromechanical energy conversion</td>
<td>30-37</td>
<td>Fitzgerald: §3.1-3.6, 3.8, 4.1-4.2, 4.4, 5.1-5.2</td>
</tr>
</tbody>
</table>

Evaluation
- Labs 20%
- Midterm 30%
- Final Exam 50%

Midterm
- All non-programmable electronic calculators are allowed.
- Midterm is scheduled for Oct. 26 at 6:10-8PM with a duration of TBD.
- Locations:
  - HA316: Last Names A-H
  - HA401: Last Names I-P
  - HA410: Last Names Q-Z

Final Exam
- Exam Type: C (Single aid sheet allowed).
- Calculator Type: 2 (All non-programmable electronic calculators)

Notes
- There are no make-up midterm or Labs. If you miss the midterm or a lab then consideration will be given, provided a petition with supporting documentation as follows:
  - If you missed a lab session and your petition is approved, your average lab mark will be calculated based on the other labs and the class average.
  - If you missed midterm and your petition is approved, your midterm mark will be transferred to the final exam.

Academic Offences
- Will be handled according to faculty policy (see the Academic Regulations section of the Faculty of Applied Science and Engineering Calendar).