**EE - 4219**  
Introduction to Electric Machinery and Drives

Curricular Designation: EE: elective  
CpE: elective

**Catalog Description:**  
EE 4219 – Introduction to Electric Machinery and Drives Provides a thorough understanding of how electric machines can be used to drive loads with control of speed, torque and position. Topics include basic electro-mechanics, rotating machinery, dc machines, ac machines, power electronics and load modeling. Applications include industrial systems, hybrid/electric vehicles and electric power systems. Credits: 3.0 Lec-Rec-Lab: (0-3-0) Semesters Offered: Spring Prerequisites: EE 2110 or EE2112 or EE 3010

**Textbooks(s) and/or Other Required Materials:**  

**Prerequisites by Topic:**  
1. Students need to have mastered the ability to write the equations for and solve a linear sinusoidal steady state circuit using phasor algebra.

**Course Objectives:**  
1. Students shall have mastered the understanding of basic electromechanical energy conversion and basic power electronic switching circuits.  
2. Students shall be familiar with the operating principles of dc motors and how it is controlled using a dc motor drive  
3. Students shall be familiar with the operating principles of ac motors  
4. Students shall have an introductory understanding of how to control ac motors with motor drives.

**Topics Covered:**  
1. Introduction to Electric Drives  
2. Review of Electric Circuits  
3. Magnetic Circuits  
4. Power Electronic Circuits  
5. Basic Structure and Operating Principles in Electrical Machines  
6. Mechanical System Modeling  
7. DC Motor Drives  
8. Control of DC Motor Drives  
9. Representation of Rotating Fields in AC Motors by Space Vectors
10. Induction Motor Drives
11. Synchronous Motor Drives
12. Vector Control of AC Drives

**Relationship of the Course Content to Program Outcomes:**

<table>
<thead>
<tr>
<th></th>
<th>Topic</th>
<th>Important</th>
<th>Moderately Important</th>
<th>Minimally Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>an ability to apply knowledge of mathematics, science and engineering</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b</td>
<td>an ability to design and conduct experiments, as well as to analyze and interpret data</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>c</td>
<td>the ability to design a system, component, or process to meet desired needs within realistic constraints such as...</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>d</td>
<td>an ability to function on multi-disciplinary teams</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>e</td>
<td>an ability to identify, formulate and solve engineering problems</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>an understanding of professional and ethical responsibility</td>
<td></td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>an ability to communicate effectively</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>h</td>
<td>the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental and societal context</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>i</td>
<td>a recognition of the need for, and an ability to engage in life-long learning</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>j</td>
<td>a knowledge of contemporary issues</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>k</td>
<td>the ability to use the techniques, skills, and modern engineering tools necessary for the practice of electrical engineering</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Contribution of Course to Meeting Degree Requirements:**
3 Credit Hours – Engineering Topics

**Class/Laboratory Schedule** (note: 1 hour = 50 minutes):
Lecture: 42 hours = 3 hours/week for 14 weeks

**Prepared by:**
Trever Hassell, Academic Advisor/Instructor, Dec 1, 2016