Instructor: Dr. M.A. Choudhry, 262 AERB  
Phone: 293-9685  
Email: machoudhry@mail.wvu.edu

Office Hours: TH 3:30-4:30,  
Class Time: MWF 10:00-10:50  
Class Location: 449 ESB

Prerequisites: EE 335, EE 336

Text: Analysis of Electrical Machinery by Paul C. Krause, Oleg Wasynczuk, and Scott D. Sudhoff.  
IEEE Press, 1995

Syllabus: Theory and modeling of synchronous, induction, and direct machines, and their steady state and transient analysis.

Course Outline: Approximate Number of 50 Min. Periods

Tentative Lecture Schedule:

I. Reference Frame Theory  
A. Equations of Transformation  
B. Stationary Circuit Variables Transformed to the Arbitrary Reference Frame  
C. Balanced Steady State Phasor Relationship  
D. Variables Observed from Several Frames of References  

II. Theory of Symmetrical Induction Machines  
A. Voltage Equations in Machine Variables  
B. Torque Equations in Machine Variables  
C. Voltage Equations in Arbitrary Reference Frame Variables  
D. Torque Equations in Arbitrary Reference Frame Variables  
E. Per Unit System  
F. Dynamic Performance During Sudden Changes in Load Torque  
G. Dynamic Performance During a Three-phase Fault at the Machine terminals

III. Theory of Synchronous Machine  
A. Voltage and Torque Equations in Machine Variables  
B. Stator Voltage Equations in Arbitrary and Rotor Reference Frames  
C. Torque Equation in Substitute Variables  
D. Analysis of Steady State Operation  
E. Dynamic Performance During a Sudden Change in Input Torque and a Three-phase Fault at the Machine Terminals  
F. Approximate Transient Torque Versus Rotor Angle Characteristic

over ......
IV. Operational Impedance and Time Constants of Synchronous Machine
   A. Standard Synchronous Machine Reactances and Time Constants
   B. Derived Synchronous Machine Time Constants
   C. Parameters from Short Circuit Characteristics
   D. Parameters from Frequency Response Characteristics

V. Theory of Brushless DC Machines
   A. Voltage and Torque Equations in Machine Variables
   B. Voltage and Torque equations in Rotor reference Frame
   C. Analysis of Steady State Operation
   D. Dynamic Performance

Other Material: Papers from IEEE and other journals

Grading Policy:

<table>
<thead>
<tr>
<th>Homework</th>
<th>15%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Hourly Tests</td>
<td>50%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td>Project</td>
<td>10%</td>
</tr>
</tbody>
</table>

100%

Unless the performance or circumstances associated with a particular student indicate otherwise, the final grade in the course will be based on the exam average according to the following scale:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 - 100</td>
</tr>
<tr>
<td>B</td>
<td>80 - 89</td>
</tr>
<tr>
<td>C</td>
<td>70 - 79</td>
</tr>
<tr>
<td>D</td>
<td>60 - 69</td>
</tr>
<tr>
<td>E</td>
<td>59 ↓</td>
</tr>
</tbody>
</table>

WVU is committed to social justice. The instructor of this course concurs with WVU’s commitment and expects to maintain a positive learning environment based upon open communication and mutual respect and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color, or national origin. Any suggestions as to how to further such a positive and open environment will be appreciated and given serious consideration.

If you are a person with disability and anticipate needing any type of accommodation in order to participate in this class, please advise us and make appropriate arrangements with Disability Services (293-6700).