University of Wisconsin - Madison  
College of Engineering [EGR]  
Last Offered: 2015-2016 Spring [1164]  
Direct Link to this Syllabus:
http://aefis.wisc.edu/index.cfm/page/CourseAdmin.ViewABET?coursecatalogid=278&pdf=True

1. E C E 355, Electromechanical Energy Conversion  
2. Credits: 3  Contact Hours: 3.0  
3. Textbook and Materials:  
   ECE 355 Class Notes  

a. Other Supplemental Materials: None

• Specific Course Information:

a. Brief description of the content of the course (Course Catalog Description): Energy storage and conversion, force and emf production, coupled circuit analysis of systems with both electrical and mechanical inputs. Applications to electric motors and generators and other electromechanical transducers.

b. Pre-requisites or Co-requisites: ECE 230, ECE 320

c. This is a Selected Elective course.

• Specific Goals for the Course:

a. Course Outcomes:

1. To introduce electro-mechanical energy conversion principles and three-phase systems, transformers, dc, induction, and synchronous machines and the power systems employing these devices.

• ABET Student Learning Outcomes:

(a) Ability to apply mathematics, science and engineering principles.
(b) Ability to design and conduct experiments, analyze and interpret data.
(c) Ability to design a system, component, or process to meet desired needs.
(e) Ability to identify, formulate and solve engineering problems.
(f) Understanding of professional and ethical responsibility.
(h) The broad education necessary to understand the impact of engineering solutions in a
global and societal context.
(i) Recognition of the need for and an ability to engage in life-long learning.
(k) Ability to use the techniques, skills and modern engineering tools necessary for
engineering practice.

- Brief List of Topics to be Covered:
  1. Power and reactive power
  2. Three-phase systems
  3. Magnetic systems
  4. Transformers
  5. Electromechanical conversion principles
  6. Principles of rotating machines
  7. DC machines
  8. Induction machines
  9. Synchronous machines
  10. Introduction to power electronic control of machines