Catalog Data: ECE 470 Electric Machines (3-0-3)(S). Magnetic materials and magnetic circuits. Transformers. Principles of electromechanical energy conversion, energy and coenergy concepts, forces and torques of electromagnetic origin. Introduction to rotating machines including synchronous and induction machines. PREREQ: ECE 212 and ECE 300.

Textbook:


Articles:


Course Coordinator:

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Office Hours: Tu-Th 9:00 a.m. – 10:30 a.m., Fr 10:00 a.m. – Noon. Other hours by appointment.
Classroom: Room MEC307, Tu-Th, 10:30 a.m. – 11:45 a.m.

Goal: The goal of this course is to model electric machines using equivalent circuit representations and to solve electric machine problems.

Prerequisites by Topic:

1. Basic circuit analysis (ECE 210)
2. Sinusoidal steady-state analysis (ECE 212)
3. Fourier Series (ECE 212)
4. Maxwell’s Equations in Integral Form (ECE 300)
Topics:

1. Course Overview.
2. Review of Maxwell’s Equations in Integral Form. (Notes)
3. Magnetic Circuits and Magnetic Materials. (Chapter 1)
4. Transformers. (Chapter 2)
5. Principles of Electromechanical Energy Conversion. (Chapter 3)
6. AC Machinery Fundamentals. (Chapter 4)
7. Synchronous Machines. (Chapter 5)
8. Induction Machines. (Chapter 6)
9. Three Exams.

Computer Usage:

- Homework will be assigned weekly. Some problems will involve writing short MATLAB scripts.
- A short simulation project will utilize machine models from the SimPowerSystems toolbox or Simulink models. Teamwork in groups of two students is allowed.

Grading Policy:

- Homework 20 %
- Simulation Project 15 %
- Three Hourly Exams 45 %
- Final Exam 20 %