EE-3221
Introduction to Motor Drives

Curricular Designation: CPE: elective EE: elective

Catalog Description:
EE 3221 - Introduction to Motor Drives Provides a thorough understanding of how electric motor drives can be used to control speed and position in various applications. Course is equally useful for nonmajors. Credits: 4.0 Lec-Rec-Lab: (0-3-2) Semesters Offered: Spring Prerequisites: EE 2110 or EE 3010

Textbooks(s) and/or Other Required Materials:
Electric Drives: An integrative approach, Ned Mohan, MNPERE, 2003 OR similar

Prerequisites by Topic:
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

Laboratory Projects:

1. basic measurements and safety
2. measuring and simulating mechanical systems
3. simulating power electronic switching circuits
4. measurements and simulation of transformers
5. measurements and simulation of dc machines
6. measurements and simulation of induction machines

Relationship of Course to Program Objectives

- **EE:**
  - Outcome: a via topics: 1-12
  - Outcome: b via Lab projects 1-6
  - Outcome: e via topic(s): 1-12
  - Outcome: k via topic(s): 1-12
  - Outcome: m via topic(s): 1-12
  - Outcome: n via topic(s): 1-12

- **CpE:**
  - Outcome: a via topics: 1-12
  - Outcome: b via Lab projects 1-6
  - Outcome: n via topic(s): 1-12
  - Outcome: p via topic(s): 1-12

Contribution of Course to Meeting the Professional Component (See UPAC SOP, Tables 1 and 2):

EE: Engineering Topics
CpE Engineering topics

Class/Laboratory Schedule (note: 1 hour = 50 minutes):

Lecture: 42 hours, Lab: 26 hours, Tests: 3 hours

Prepared by:

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