

ABET COURSE SYLLABUS**EPOW-4020: Electromechanics**

Course Catalog Description: This course studies electromechanical interactions in lumped-parameter systems. These interactions describe the operation of electric machines, electromechanical actuators and transducers. The fundamental laws of Faraday, Ampere and Gauss are considered to develop physical models of magnetic circuits, including those which use permanent magnets. These models are then expanded to include equations of motion and the thermodynamics of electromechanical coupling. Applications include transformers, induction machines, synchronous machines, DC machines, and reluctance machines.

Pre-Requisite Courses: ECSE-2010, ENGR-4300

Co-Requisite Courses: None

Prerequisites by Topic:

1. Magnetic field, Faraday's law, Ampere's law , Lenz's law
2. Analysis of electric circuits
3. Three-phase systems
4. Phasors
5. Complex algebra

Textbook: *Electric Machinery* by Fitzgerald, Kingsley and Umans
(and/or other required material) Class notes

References: *Electric Machinery and Transformers* by Bhag S. Guru
Electric Machinery Fundamentals by S. J. Chapman

Course Coordinator: Leila Parsa

Overall Educational Objective: The overall educational objective of the course is that the students learn the basics of electromechanical energy conversion and understand the basis of operation of various electric machines, transformers and magnetic circuits.

Course Learning Outcomes:

1. Learn the basics of magnetic circuits
2. Understand the operation of single phase and three phase transformers, their equivalent circuits and how to measure their parameters
3. Understand the principle of electromechanical energy conversion
4. Understand the fundamentals of synchronous machines both in generating and motoring mode and analyze them based on the equivalent circuit
5. Understand the operation of induction motors and the equivalent circuit for analyzing them
6. Fully analyze various kinds of DC machines

How Course Outcomes are Assessed: Homeworks
Exams
Course project

Relation to EE/CSE/EPE Outcomes

Outcome	Level	Demonstrate Proficiency
	N, M, H	e.g. Exams, projects, HW
Mathematics, science and engineering	H	HW, exams
Basic disciplines in Electrical Engineering	N	
Depth in Electrical Engineering	H	HW, exams
Basic disciplines in Computer & Sys. Eng.	N	
Depth in Computer and Systems Eng.	N	

N = none
M = moderate
H = high

