

**Course Number:** EE 306

**Course Title:** Electromechanical Devices (Non-EE Student)

**Course Description :**

Magnetic circuits. Transformers. Concepts of electric machines. DC generators and motors operation. Three-phase Induction motors. Motor starting. Synchronous machines. Parallel operation. Fractional Horsepower Motors.

**Prerequisites :**

Fundamentals of Electrical Circuits (EE 204)

**Textbook :**

Electrical Machinery Fundamental. By: Stephen J. Chapman, 2012, 5<sup>th</sup> edition.

**Other useful references and material :**

Electromechanical Energy Devices and Power Systems. By: Zia A. Yamayee, Juan L. Bala, Jr., 1994.

**Course objectives:**

After successfully completing the course, the students will be able to

- understand basic concepts of electrical machines
- will learn how to start and operate an electrical machine;
- learn the details of construction of different types of electrical machines;
- learn how to analyze the performance and design the components

**Topics Covered :**

- Three phase systems and power measurements
- Magnetic circuits
- Single phase and three-phase transformers, autotransformers
- DC Generators
- DC Motors
- Synchronous generators
- Synchronous motors
- Three phase induction motors

**Class/Laboratory Schedule :**

2 lectures per week, 50 minutes each and 3 hours lab per week.

**Contribution of course to Meeting the professional component :**

The students will learn fundamentals of electrical machinery. They will learn to analyze the voltage-current, torque-speed characteristics of the different devices. In the laboratory they will have hands-on experience with starting and operation of different types of machines. They will experiment with the behavior and performance of different types of transformers, generators and motors. Course design projects involve design of components like machine parameters and machine rating for different loads.

**Course Outcomes:**

1. An ability to apply knowledge of mathematics, science, and engineering to the analysis of electrical machineries.
2. Design and conduct experiments, as well as to analyze and interpret data.
3. An ability to identify, to formulate, and solve engineering problems in the area of electromechanical energy conversion devices.
4. Acquire knowledge of contemporary issues

5. Use the techniques, skills, and modern engineering tools necessary for engineering practice.

**Course Outcomes to Program Outcome Mapping:**

Course Outcome	Program Outcome												
	a	b	c	d	e	f	g	h	i	j	k	l	m
1	X												
2		X											
3					X								
4										X			
5											X		

**Prepared by** Dr. Mahmoud Kassas, May 8, 2012.