

**Course description:**

This course covers the fundamentals of electric machines; magnetic circuits; 3-phase system; single-phase transformers; 3-phase transformers; direct current machines: shunt, series, compound DC motors; DC motors performance and characteristics, DC motors starting and speed control, DC generators performance and characteristics.

Aims of the course:

1. Understand and perform magnetic circuit analysis and magnetic force calculations
2. Understand various types of electric motor and generator principles
3. Analyze three phase systems
4. Analyze single phase transformer, three phase transformer and autotransformer, perform per unit calculations.
5. Understand the construction, characteristics and behavior of DC machines (generators and motors)
6. Analyze the performance of DC machines
7. Design and construct DC speed control and starting circuits

Intended Learning Outcomes (ILOs):

- 1) **Application skills - with ability to** apply math and physics to understand the principles of electromagnetics and electrical machines and three phase systems.
- 2) **Analysis skills – with ability to** Use advanced circuit analysis to construct and analyze various types of electrical machines equivalent circuits.
- 3) **Evaluate Skills - with ability to** compare and contrast various types of electrical machines based on their performance analysis and operation.
- 4) **Create skills – with ability to** Design starting circuitries for various types of electrical machines and to control their speed to achieve their operational objectives.

Course structures:

Week	C. Hrs	ILOs	Topics	Teaching Procedure	Assessment methods
Week 1		1	Syllabus, Course Schedule; Theory of electromechanical energy conversion and concepts of fundamental torque equation rotating and oscillating fields	PPT. lecture	HWs and
Week 2-5		2	Magnetic circuits	PPT. lecture	HWs & Quizes 1 st Exam TBD

Week	C. Hrs	ILOs	Topics	Teaching Procedure	Assessment methods
Week 6-10		1	Review of 3phase systems Transformers	PPT. lecture	HWs & Quizes 2 nd Exam TBD
Week 11-15		2+3+ 4	DC machines	PPT. lecture	HWs Final Exam (TBD)

References:

Electric Machinery Fundamentals. Fourth edition (McGraw-Hill Series in Electrical and Computer Engineering) Stephen Chapman, 2005

Assessment Methods:

Methods	Grade	Date
Quizzes	5	TBD
HWs	5	TBD
First Exam	20	TBD
Second Exam	20	TBD
Final Exam	50	TBD