



Course name: EE319 Electromechanical Energy Conversion I		Department: Electrical and Electronics Engineering			Semester
					5
Methods of Education					Credit (ECTS)
Lecture	Study Time	Homework	Exam (incl. Preparation)	Total	5
42	38	30	30	140	

Language: English

Compulsory/Elective: Compulsory

Prerequisites: None

Course Contents: Electromagnetic materials and circuits, Properties of ferromagnetic materials, Single-phase and three phase transformers, Per Unit System, Principles of electromechanical energy conversion.

Course Objective:

- Students will be able to comprehend the role of electromechanical energy conversion in power systems
- Students will be able to understand operation principles, analysis and design of magnetic circuits
- Students will be able to understand operation principles and analysis of magnetically coupled circuits
- Students will be able to comprehend electromechanical energy conversion principles and devices

Learning Outcomes and Competences:

Students who pass the course will be able to:

- Learn the principle of energy conversion, electromechanical energy conversion in the overall energy conversion problems.
- Understand magnetic circuits and methods of analysis, flux linkage, inductance, permanent magnet systems.
- Know magnetic materials, AC excitation and losses, design of magnetic circuits containing permanent magnets
- Learn ideal transformer, practical transformer and the derivation of its equivalent circuits and induced EMF expressions.
- Understand performance calculations: voltage regulation and efficiency.
- Know transformers in three-phase circuits, short-circuit and open-circuit tests and parameter calculation.
- Learn Effects of shape of the air gap on torque expression
- Understand induced EMF, electromechanical torque and gross mechanical output power, excitation methods and magnetization characteristics.
- Learn the rotational magnetic field and AC machines
- Phasor diagrams for salient-pole and round rotor synchronous machines (motors and generators)

Textbook and /or References:

1- ELECTRIC MACHINERY FUNDAMENTALS, 5th EDITION, Stephen J. Chapman
 2- E. Fitzgerald, Charles Kingsley, Jr., and Stephen D. Umans, Electric Machinery, Sixth Edition, McGraw-Hill, 2003.

Assessment Criteria	If any, mark as (X)	Percentage (%)
Midterm Exams	X	30
Quizzes		
Homework	X	10
Projects		
Term Paper		
Laboratory work		

	Other		
	Final Exam	X	60
Instructors	Prof. Dr. Ahmet KARAARSLAN		
Weekly Schedule			
Week	Subject		
1	Introduction to Machinery Principles		
2	Properties of Magnetic Materials		
3	Newton's Law, Rotational Motion and Power Relations		
4	Single Phase Transformers		
5	Equivalent Circuit of a Transformer		
6	Per Unit Systems and Auto Transformers		
7	Three Phase Transformers		
8	Three Phase Transformers		
9	Mid-term Exam		
10	AC Machinery Fundamentals		
11	AC Machinery Fundamentals		
12	Three Phase Synchronous Generators		
13	Three Phase Synchronous Generators		
14	Three Phase Synchronous Motors		
15	Three Phase Synchronous Motors		