

## Electrical Engineering 362: Electromechanical Energy Conversion

**Course Description:** 4 cr. U. Principles of electrical and electromechanical energy conversion; three-phase circuits, transformers, three-phase induction and synchronous machines, d.c. machines, including design parameters and testing; with laboratory (3 hr lc recitation & 2 hr la per week). Prereq: eleceng 361(p).

**Textbook:** Electric Machinery, A. E. Fitzgerald, C. Kingsley, S. D. Umans, McGraw-Hill

### Prerequisites by Topics:

- Concepts of electrical conductivity and resistivity
- Concepts of magnetic flux production
- Magnetic circuit analysis

### Course Learning Objectives:

- Students will be able to analyze magnetic circuits.
- Students will be able to resolve three-phase circuit problems.
- Students will be able to analyze single-phase and three-phase transformers.
- Students will be able to analyze basic dc and ac electric machines.
- Students will be able to analyze dc motors.
- Students will be able to analyze synchronous machines.
- Students will be able to analyze induction motors.
- Students will be able to perform basic machinery simulations using software analysis tools (MATLAB).

### Topics Covered:

- Basic magnetic circuits
- Three-phase circuits
- Single-phase and three-phase transformers
- Ac and dc machinery fundamentals
- Synchronous motors and generators
- Induction motors
- Dc motors and generators

**Class/Laboratory Schedule:** 42 lectures, 7 laboratory sections

### Contribution of Course to Meeting the Professional Component:

This course contributes to the engineering sciences component of the curriculum. Students learn fundamental electrical engineering science concepts related to electric machinery and power systems.

### Relationship to Program Objectives:

Program Outcome	Explanation
i,ii.	Students will learn fundamental material concerning energy and energy conversion.
v.	Students will perform laboratory experiments on three-phase power and common electric motors.

- vi, vii. Students will use MATLAB to analyze basic electric machine concepts.
- xi. Students will perform laboratory experiments as a team.

**Prepared by:** Adel Nasiri, November 01, 2007.

**Methods of Assessment:**

- Graded homework
- Graded examinations
- Graded in class quizzes
- Graded lab reports
- Course evaluation by students
- Instructor judgment

**Resources Commonly Available:**

- Instructor
- Teaching assistant (lab sections)
- MATLAB software

**Desirable Student Competencies:**

- Algebra, phasor analysis, general physics principles