1. *Course number and name*

**ENGR 306: Electromechanical Systems**

1. *Credits and contact hours*

3 credits; two 75-minute lectures per week; engineering topic; engineering topic

1. *Instructor’s or course coordinator’s name*

Instructor: Rashid R. Kohan

Course coordinator: Hao Jiang

1. *Text book, title, author, and year*

Chapman, *Electric Machinery Fundamentals*, McGraw-Hill, 5th Edition, 2012

1. *other supplemental materials*

• Sen, *Principles of Electrical Machines and Power Electronics*

• Mulukutla Sarma, *Electrical Machines*

• Dino Zorbas, *Electric Machines*

• Nasar, *Electric Machines and Electromechanics: Schaum’s Outlines*

1. *Specific course information*
2. *brief description of the content of the course (catalog description*

Principles of Electromechanical Energy Conversion. Operating Characteristics of

Transformers, AC Rotating Machines. Speed, Torque, and Profile Control of Rotating Machines

1. *prerequisites or co-requisites*

ENGR 205 with a grade of C- or better

1. *indicate whether a required, elective, or selected elective course in the program*

Required for Electrical Engineering

Elective for Computer and Mechanical Engineering

1. *Specific goals for the course*
2. *specific outcomes of instruction*

* The students will demonstrate their ability to analyze single and three phase AC electrical circuits to obtain relevant information of interest.
* The students will demonstrate their understanding of phasor diagrams, power factor, electrical demand, energy consumption, etc.
* The students will demonstrate their understanding of energy conversion principles.
* The students will demonstrate their understanding of essential elements of all energy conversion systems and their external power supply requirements.
* The students will demonstrate their understanding of uniqueness and applicability of different members of rotating machine family.
* The students will demonstrate their ability to determine the most appropriate models for transformers and rotating machines under specified operating conditions.
* The students will demonstrate their ability to analyze, select, size, and specify transformer in order to meet design specifications.
* The students will demonstrate their ability to analyze performances and electrical behaviors of given rotating machines.
* The students will demonstrate their ability to select a specific type of rotating machines and size the rotating machine properly in order to meet application’s requirements.
* The students will demonstrate their ability to use MATLAB to analyze single and three phase electrical circuits.
* The students will demonstrate their ability to use MATLAB to solve performances and behavior of transformers and rotating machines using equivalent circuits or model.

1. *explicitly indicate which of the student outcomes listed in Criterion 3 or any other outcomes are addressed by the course.*

Course addresses ABET Student Outcome(s): 1, 2, 3, 7

1. *Brief list of topics to be covered*

* Review of AC circuit and basic AC circuit concepts like power factor, phasor diagram, power measurement technique, etc.
* Magnetic Circuit Analysis
* Power Transformer: What is it and how to select and size it?
* Principles of Energy Conversion and Rotating Machines
* AC Rotating Machines
* DC Rotating Machines