

# University of Toledo

## Electrical Engineering Technology

### Master Syllabus

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**Course Title:** Electric Power Systems

**Course Code & Number:** EET 4350

**Credit Hour Total:** 4 Semester Hours

**Lecture Contact Hours:** 3

**Lab Contact Hours:** 2

**Prerequisite:** EET 1020, Reactive Circuits

**Texts:** Rotating Electric Machinery and Transformer Technology, Richardson and Cassie, Prentice Hall, 4<sup>th</sup> Edition

**Software:** Microsoft Excel

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#### A. Course Description

This course constitute a study of AC/DC machines, including transformers, power transmission and the regulation governing them as specified by the industry and the National Electric Code. It covers the construction, operation, selection and control selection DC/AC generators and motors. This course also enhances the student's lab experience by connecting motors and generator in the lab and analyzing test results.

#### B. Related Program Outcomes ( a, b, c ):

- An understanding of the analytical and laboratory skills associated with electrical engineering technology, as evidenced by analyzing machine models under different loading conditions in homework and exams.
- An ability to apply current knowledge and adapt to emerging applications of mathematics, science and technology, as evidenced by the use of mathematical equations to analyze electronic machines and transformers in homework and exams.
- An ability to conduct, analyze and interpret experiments concerning electrical engineering technology, as evidenced by data collection and analysis in lab reports.

#### C. Course Objectives:

- To study the construction and operation of DC motors and Generators.
- To study the selection and control of DC motors.
- To study the construction of synchronous machines.
- To study the construction, characteristics and selection of induction motors.
- To study the electrical characteristics of transformers.
- To study the classification and selection of single-phase motors.
- To study the operation and selection of servo and stepper motors.
- To use the knowledge of math and science in studying the loading conditions of machines and transformers.

- To enhance creativity through innovative project designs.
- To integrate real life applications and latest technology into labs and projects.
- To connect motors and generators in the laboratory and make performance measurements.
- To graph experimental data from motor tests and present the results in a written and/or oral report.

#### **D. Course Outline – Major Content Areas**

- Electromechanical Energy Conversion
- Machine Construction
- DC Generator
- DC Motor
- Efficiency of DC Machine
- AC Dynamos
- Synchronous Alternators
- Transformers
- Equivalent Circuits
- Transformer Types
- Transformer Connections
- Polyphase Induction Motors
- Synchronous Motors
- Single Phase Induction Motors
- Stepper Motors

#### **E. Major Laboratory Topics**

- Magnetic Saturation.
- DC Generators.
- DC Motors.
- Efficiency of DC machines.
- Motor Speed Control.
- Synchronous Alternators.
- AC Voltage Regulation.
- Transformers
- Three Phase Transformers.
- Induction Motors.
- Stepper Motors