REGULAR COURSE SYLLABUS

School of: Professional Studies

Department: Engineering Technology

Prefix & Course Number: EET 3410 Crosslisted With*: _____

Course Title: Electric Machines

Check All That Apply: Required for Major: X Required for Minor: _____ Specified Elective: Required for Concentration: ___ Elective: ___ Service Course: _____

Credit Hours: 3 (2+2)

Total Contact Hours per semester (assuming 15-16 week semester):

Lecture 30 Lab 30 Internship _____ Practicum _____ Other (please specify type and hours): _____

Schedule Type(s): B Grading Mode(s): L

Variable Topics Courses (list restrictions, including the maximum number of hours that can be earned**):

** NOTE: This information must be included in the course description.

Restrictions (Variable Topics Course): _____

Prerequisite(s): (EET 2145 or EET 3010) and MTH 2410, with grades of “C” or better

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Banner Enforced:

Prerequisite(s): (EET 2145 or EET 3010) and MTH 2410, with grades of “C” or better.

Corequisite(s): _____

Prerequisite(s) or Corequisite(s): _____

Catalog Course Description:

This course studies motors and generators and their applications. Topics include: magnetism and magnetic circuits, voltage and torque generation, DC motors, DC generators, single and three phase transformers, and synchronous alternators.

APPROVED: Richard Rosso

Department Chair OR Program Director Date 3/1/2011

Dean OR Associate Dean Date 3/1/11

Associate VP, Academic Affairs Date 6/23/11

*If crosslisted, attach completed Course Crosslisting Agreement Form
Required Reading and Other Materials will be equivalent to:

Specific, Measurable Student Behavioral Learning Objectives:
Upon completion of this course the student should be able to:
1. Analyze and use the following equipment: basic motor and generator systems, induction motors, three-phase transformers and motors and synchronous motors
2. Describe DC and 3-phase electric motor constructions
3. Compare and contrast a variety of DC and AC motors
4. Describe the theory and operation of electric motors
5. Formulate motor specifications for a variety of applications

Detailed Outline of Course Content (Major Topics and Subtopics) or Outline of Field Experience/Internship (experience, responsibilities and supervision):
I. Magnetism and Magnetic Circuits:
   A. Basic Units
      1. Flux
      2. MMF
      3. Reluctance
      4. Nonlinear Effects of Ferromagnetic Material
   B. Magnetic Circuits

II. Principles of Voltage & Torque Generation:
   A. Voltage Induced in Conductor
   B. Voltage Induced by Coil
   C. Lenz's Law
   D. Force Produced by Conductor
      1. Biot-Savart Law
      2. Direction of Force
   E. Torque Produced by Conductor
   F. Back EMF

III. D.C. Generator Characteristics:
   A. Basic Generator Equation
   B. Equivalent Circuit
   C. Separately Excited
   D. Voltage Regulation
   E. Losses and Efficiency
   F. Shunt
   G. Series
   H. Compound
   I. Parallel Operation

IV. D.C. Motor:
   A. Basic Motor Equation
   B. Back EMF
   C. Equivalent Circuit
   D. Speed Regulation

E. Losses & Efficiency
F. Shunt
G. Series
H. Compound
I. PM
J. Starting D.C. Motors
K. Stopping D.C. Motors

V. Transformers:
   A. Single-Phase A.C. Circuits (review)
   B. Basic Transformer Theory
   C. Practical Single Phase Transformers
   D. Three-Phase A.C. Circuits
   E. Three-Phase Transformers

VI. Synchronous Alternator:
   A. Construction
   B. Frequency Relationships
   C. Generated Voltage
   D. Three-Phase Alternator
   E. Ratings & Connectors
   F. Equivalent Circuits
   G. Voltage Regulation
   H. Losses & Efficiency
   I. Typical Characteristics

VII. Three-Phase Synchronous Motor:
   A. Construction
   B. Theory of Operation
   C. Starting Techniques
   D. Power, Efficiency & Torque
   E. Typical Characteristics
   F. Power Factor Correction
VIII. Three-Phase Induction Motor:
   A. Construction
   B. Rotating Field Concept
   C. Theory of Operation
   D. Speed Relationships
   E. Analysis of Rotor Behavior
   F. Losses & Efficiency
   G. Typical Characteristics

H. Starting Techniques

IX. Induction Generator:
   A. Theory of Operation
   B. Losses & Efficiency
   C. Typical Characteristics
   D. Applications

Evaluation of Student Performance:
1. Written exams
2. Written lab reports