

METROPOLITAN STATE COLLEGE of DENVER
Office of Academic Affairs

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: 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:


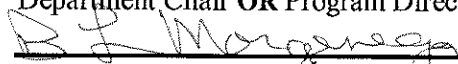
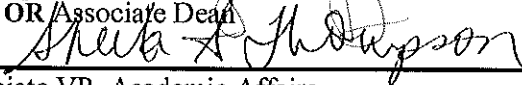
Prerequisite(s): (EET 2145 or EET 3010) and MTH 2410, with grades of "C" or better,

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:		3/1/2011
Department Chair OR Program Director		Date
		3-1-11
Dean OR Associate Dean		Date
		6/2/11
Associate VP, Academic Affairs		Date

*If crosslisted, attach completed Course Crosslisting Agreement Form

Required Reading and Other Materials will be equivalent to:

Wildi (2005). *Electrical Machines, Drives, & Power Systems* 6th Edition, or latest edition. Upper Saddle Hill, NJ: Prentice Hall

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):

- | | |
|---|--|
| <p>I. Magnetism and Magnetic Circuits:</p> <p>A. Basic Units</p> <ol style="list-style-type: none"> 1. Flux 2. MMF 3. Reluctance 4. Nonlinear Effects of Ferromagnetic Material <p>B. Magnetic Circuits</p> | <p>E. Losses & Efficiency</p> <p>F. Shunt</p> <p>G. Series</p> <p>H. Compound</p> <p>I. PM</p> <p>J. Starting D.C. Motors</p> <p>K. Stopping D.C. Motors</p> |
| <p>II. Principles of Voltage & Torque Generation:</p> <p>A. Voltage Induced in Conductor</p> <p>B. Voltage Induced by Coil</p> <p>C. Lenz's Law</p> <p>D. Force Produced by Conductor</p> <ol style="list-style-type: none"> 1. Biot-Savart Law 2. Direction of Force <p>E. Torque Produced by Conductor</p> <p>F. Back EMF</p> | <p>V. Transformers:</p> <p>A. Single-Phase A.C. Circuits (review)</p> <p>B. Basic Transformer Theory</p> <p>C. Practical Single Phase Transformers</p> <p>D. Three-Phase A.C. Circuits</p> <p>E. Three-Phase Transformers</p> |
| <p>III. D.C. Generator Characteristics:</p> <p>A. Basic Generator Equation</p> <p>B. Equivalent Circuit</p> <p>C. Separately Excited</p> <p>D. Voltage Regulation</p> <p>E. Losses and Efficiency</p> <p>F. Shunt</p> <p>G. Series</p> <p>H. Compound</p> <p>I. Parallel Operation</p> | <p>VI. Synchronous Alternator:</p> <p>A. Construction</p> <p>B. Frequency Relationships</p> <p>C. Generated Voltage</p> <p>D. Three-Phase Alternator</p> <p>E. Ratings & Connectors</p> <p>F. Equivalent Circuits</p> <p>G. Voltage Regulation</p> <p>H. Losses & Efficiency</p> <p>I. Typical Characteristics</p> |
| <p>IV. D.C. Motor:</p> <p>A. Basic Motor Equation</p> <p>B. Back EMF</p> <p>C. Equivalent Circuit</p> <p>D. Speed Regulation</p> | <p>VII. Three-Phase Synchronous Motor:</p> <p>A. Construction</p> <p>B. Theory of Operation</p> <p>C. Starting Techniques</p> <p>D. Power, Efficiency & Torque</p> <p>E. Typical Characteristics</p> <p>F. Power Factor Correction</p> |

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