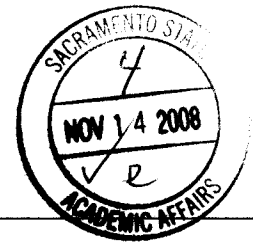




SACRAMENTO  
STATE

# Course Change Proposal Form A



<b>Academic Group (College):</b> Engineering & Computer Science	<b>Academic Organization (Department):</b> Electrical & Electronic Engineering	<b>Date:</b> 10/6/2008
<b>Type of Course Proposal:</b> New ___ Change <u>X</u> Deletion ___	<b>Department Chair:</b> Dr. Suresh Vadhva	<b>Submitted by:</b> Dr. Suresh Vadhva
<b>Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes <u>X</u> No ___</b>	<b>For Catalog Copy: Yes <u>X</u> No ___</b> <b>CCE (Extension): Yes ___ No ___</b>	<b>Semester Effective:</b> Fall ___ Spring <u>X</u> , 2009__

This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number):

**Change from:**

<b>Subject Area (prefix) &amp; Catalog Nbr (course no.):</b> EEE 130	<b>Title:</b> Electromechanical Conversion	<b>Units:</b> 3
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**Change to:**

<b>Subject Area (prefix) &amp; Catalog Nbr (course no.):</b>	<b>Title:</b>	<b>Units:</b>
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**JUSTIFICATION:**

**Prerequisite change only. From EEE 117 to EEE 117; may be taken concurrently. The course requires knowledge of circuits and three-phase. The circuit component is covered sufficiently in Engr 17. We have coordinated among instructors to cover the three-phase within the first two weeks of the semester before it is needed in EEE 130.**

**NEW COURSE DESCRIPTION:** (Not to exceed 80 words and language should conform to catalog copy. See <http://www.csus.edu/acaf/univmanual/crspsl.htm> - Guidelines for Catalog Course Description)

**EEE 130. Electromechanical Conversion.** Magnetic circuits and principles of electromechanical energy conversion, 3-Phase, DC machines, state equations, terminal characteristics, transformers, AC machines, terminal characteristics of synchronous machines, stability considerations. Induction machine theory. Introduction to energy sources including conventional and nuclear power plants.

**Note:**

**Prerequisite:** EEE 117; may be taken concurrently  
**Enforced at Registration:** Yes X No \_\_\_

**Corequisite:**  
**Enforced at Registration:** Yes \_\_\_ No X

**CAN (California Articulation Number):**

**Graded:** Letter X Credit/No Credit \_\_\_ **Instructor Approval Required?** Yes \_\_\_ No X

**Course Classification (e.g., lecture, lab, seminar, discussion):**  
C04 **Title for CMS (not more than 30 characters):**  
Electromechanical Conversion

<b>Cross Listed?</b> Yes ___ No <u>X</u>	<b>If yes, do they meet together and fulfill the same requirement, and what is the other course.</b>
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**How Many Times Can This Course be Taken for Credit?** \_\_\_ 1 \_\_\_

**Can the course be taken for Credit more than once during the same term?** Yes \_\_\_ No X

**FOR NEW COURSE PROPOSALS OR SUBSTANTIVE CHANGES ONLY:**

**Description of the Expected Learning Outcomes:** Describe outcomes using the following format: "Students will be able to: 1), 2), etc."  
See the example at <http://www.csus.edu/acaf/example.htm>

**\*\*Attach a list of the required/recommended course readings and activities [Note: it is understood that these are updated and modified as needed by the instructor(s).] This attachment should be forwarded only to your Dean's office, not Academic Affairs.**

**Assessment Strategies:** A description of the assessment strategies (e.g., portfolios, examinations, performances, pre-and post-tests, conferences with students, student papers) which will be used by the instructor to determine the extent to which students have achieved the learning outcomes noted above:

**For whom is this course being developed?**

Majors in the Dept \_\_\_ Majors of other Depts. \_\_\_ Minors in the Dept \_\_\_ General Education \_\_\_ Other \_\_\_

Is this course required in a degree program (major, minor, graduate degree, certificate)? Yes \_\_\_ No \_\_\_

If yes, identify program(s):

Does the proposed change or addition cause a significant increase in the use of College or University resources (lab room, computer facilities, faculty, etc.)? Yes \_\_\_ No \_\_\_

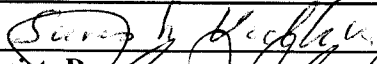
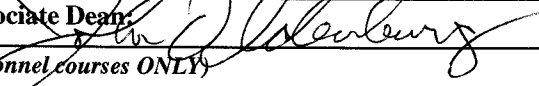
If yes, attach a description of resources needed and verify that resources are available.

Indicate which department or programs will be affected by the proposed course (if any). \_\_\_\_\_

*The Department Chair's signature below indicates that affected programs have been sent a copy of this proposal form.*

**Approvals:** If proposed change, new course or deletion is approved, sign and date below. If not approved, forward without signing to the next reviewing authority, and attach an explanatory memorandum to the original copy.

**Signatures:**

Signatures:	Date
Department Chair: 	11/12/2008
College Dean or Associate Dean: 	11/12/2008
CPSP (for school personnel courses ONLY)	
Associate Vice President and Dean for Academic Programs	

**Distribution:** Academic Affairs (original), Department Chair and College Dean. Dean's office to send original after approval to Academic Affairs, at mail zip 6016. An electronic copy must also be sent.

# **EEE 130 ELECTROMECHANICAL CONVERSION**

## **Required Course**

**2008 -2010 Catalog Data:** **EEE 130. Electromechanical Conversion.** Magnetic circuits and principles of electromechanical energy conversion, three,-phase, DC machines, state equations, terminal characteristics, transformers, AC machines, terminal characteristics of synchronous machines, stability considerations. Induction machine theory. Introduction to energy sources including conventional and nuclear power plants.

**Prerequisite:** EEE 117; EEE 117; may be taken concurrently. 3 units.

**Textbook:** Gonen, Turan, Electrical Machinery, Power International Press, 1998.

## **Course Objectives:**

1. To give the student an introductory knowledge of electrical power systems, three-phase circuits, magnetic circuits.
2. To provide the student with basic information on transformers, electromechanical energy conversion, induction machines, synchronous machines, direct-current machines, and single-phase and special purpose motors.

## **Prerequisite by Topic:**

1. Basic knowledge of electrical and magnetic fields from ENGR 17
2. Basic knowledge of electrical circuit theory and applications from EEE 117
3. Introduction to basic electromagnetic theory from ENGR 17

## **Topics Covered/Evaluation:**

1. Brief review of electric power systems, real and reactive powers and an overview of electric machines (0.5 week).
2. Magnetic circuits: Magnetic field of current-carrying conductors, ampere's magnetic circuital law, magnetic circuits with and without air gaps, ferromagnetism, magnetic core losses, hysteresis and eddy-current losses, flux determination for a given mmf, and permanent magnets (1 week).
3. Brief review of three-phase circuits, including wye- and delta- connected sources, balanced and unbalanced three-phase loads, measurement of average power in three-phase circuits, and power factor correction (1 week).
4. Transformers: Faraday's and lenz's laws, the ideal and real transformers, equivalent circuits, the open and short circuit tests, performance characteristics, voltage regulation, transformer efficiency, three-phase transformers, autotransformers, instrument transformers, and current inrush. (3 weeks).
5. Fundamental Electromechanical energy conversion principles and their applications, (0.5 weeks).
6. Induction machines: the rotating magnetic field concept, induced voltages, rotor slip and its effects equivalent circuit of an induction motor, stator circuit model, rotor circuit model, the equivalent circuit at start-up, power and torque determination by Thevenin, performance characteristics, control of motor characteristics, starting of induction motors, direct on line starting, reduced-voltage starting, current limiting by series resistance or impedance, speed control, determination of equivalent circuit parameters, the block rotor test.(1 week).
7. Synchronous machines: construction, field excitation, stator windings, synchronous speed, equivalent circuits, motor and generator operations, power and torque characteristics, stiffness, infinite bus, isolated synchronous machine operation, damper windings, starting of synchronous motors, synchronous condenser, circuit parameter tests, unsaturated and saturated reactance, parallel operation of generators, salient-pole machines (2 weeks).

8. Direct-current machines: construction, armature windings, armature voltage, field excitation, armature reaction, commutation, compensation windings, magnetization curve, dc generator types, voltage regulation, developed power and torque, efficiency, motor characteristics, speed regulation, the speed- torque and speed-current characteristics, dc motor starting and braking (2 weeks).
  9. Single-phase and special purpose motors: induction motors, split-phase motors, capacitor-start and run motors, shaded pole motors, universal motors, and others (1 week).
- Exams – 2 midterms, 1 final exam (1.5 weeks).

**Evaluation:**

Three-examinations (including the “Final”) – 90% of the final grade in the course.

(Note: Examinations will be “closed book” problems similar to examples done in class and homework assignments. The final will include both a comprehensive assessment part and specific coverage of the last 4 weeks of course material.)

Graded homework assignments – 10% of the final grade in the course.

**Contribution of Course to the Professional Education Component:**

- Homework assignments include practical devices and analytical design of rotating machines.
- Class provides breadth and depth through study of three-phase power, electromagnetics, and electrical machinery.
- Science and Design Content Distribution: Engineering Science – 67%, Engineering Design - 33%.

**Relationship of Course to Program Outcomes:**

- #3. Problem solving: The course requires the calculation of circuit components involving three-phase systems, transformers and electrical machines.
- #4. Knowledge of core EEE topics: This course provides a working knowledge in circuits, magnetics, electromagnetics, electric power systems and electric machines.
- #5. Depth in one EEE area: This course provides depth in the area of Power Engineering.

**Student Learning Outcome to Course Objective Grid:**

Course Objectives →	1 To give the student an introductory knowledge of electrical power systems, three-phase circuits, magnetic circuits	2 To provide the student with basic information on transformers, electromechanical energy conversion, induction machines, synchronous machines, direct-current machines, and single-phase and special purpose motors
Program Outcome ↓ 3	x	X
4	X	X
5	x	x

**Course Coordinator:** Turan Gonen, EEE

**Date:** Nov. 10, 2008

# **EEE 130 ELECTROMECHANICAL CONVERSION**

## **Required Course**

**2006 -2008 Catalog Data:** EEE 130. **Electromechanical Conversion.** Magnetic circuits and principles of electromechanical energy conversion, DC machines, state equations, terminal characteristics, transformers, AC machines, terminal characteristics of synchronous machines, stability considerations. Induction machine theory. Introduction to energy sources including conventional and nuclear power plants.  
**Prerequisite:** EEE 117. 3 units.

**Textbook:** Gonen, Turan, Electrical Machinery, Power International Press, 1998.

## **Course Objectives:**

1. To give the student an introductory knowledge of electrical power systems, three-phase circuits, magnetic circuits.
2. To provide the student with basic information on transformers, electromechanical energy conversion, induction machines, synchronous machines, direct-current machines, and single-phase and special purpose motors.

## **Prerequisite by Topic:**

1. Basic knowledge of electrical and magnetic fields from EEE 17
2. Basic knowledge of electrical circuit theory and applications from EEE 117
3. Introduction to basic electromagnetic theory from EEE 17
4. Introduction to three-phase power circuits from EEE 117

## **Topics Covered/Evaluation:**

1. Brief review of electric power systems, real and reactive powers and an overview of electric machines (0.5 week).
2. Brief review of three-phase circuits, including wye- and delta- connected sources, balanced and unbalanced three-phase loads, measurement of average power in three-phase circuits, and power factor correction (1 week).
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### Relationship of Course to Program Outcomes:

- #3. Problem solving: The course requires the calculation of circuit components involving three-phase systems, transformers and electrical machines.
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### Student Learning Outcome to Course Objective Grid:

Course Objectives →	1 To give the student an introductory knowledge of electrical power systems, three-phase circuits, magnetic circuits	2 To provide the student with basic information on transformers, electromechanical energy conversion, induction machines, synchronous machines, direct-current machines, and single-phase and special purpose motors
Program Outcome ↓	x	X
3		
4	X	X
5	x	x

**Course Coordinator:** Turan Gonen, EEE

**Date:** May 15, 2008