



SACRAMENTO
STATE

Course Change Proposal Form A



09/10

Academic Group (College): Engineering and Computer Science	Academic Organization (Department): Electrical & Electronic Engineering	Date: April 20, 2009
Type of Course Proposal: New <input checked="" type="checkbox"/> Change <input type="checkbox"/> Deletion <input type="checkbox"/>	Department Chair: Suresh Vadhva	Submitted by: Turan Gonen
Does this course fulfill a requirement for single-subject or multiple subject credential students? Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	For Catalog Copy: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> CCE (Extension): Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	Semester Effective: Fall <input checked="" type="checkbox"/> Spring <input type="checkbox"/> , 2009

This course replaces experimental course Subject Area (prefix) and Catalog Nbr (course number):	
If changing an existing course, should new version be considered a repeat of the original version? If so, the same Course ID will be maintained. If not, a new Course ID will be assigned. Note: In PeopleSoft terminology, the Course ID is the unique system identifier, not the Catalog Nbr.	Yes <input type="checkbox"/> No <input type="checkbox"/>

Change from:

Subject Area (prefix) & Catalog Nbr (course no.):	Title:	Units:
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Change to:

Subject Area (prefix) & Catalog Nbr (course no.): EEE 135	Title: Renewable Electrical Energy Sources and Grid Integration	Units: 3
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JUSTIFICATION:

This course is an elective with an emphasis on sources of renewable electrical energy. It is particularly important for engineering designers to understand the integration of renewable energy in the electrical power grid.

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

The study of existing sources of renewable electrical energy such as wind, solar, geothermal, hydro, tidal, wave power, and biomass. Emphasis on wind and solar energy sources and their integration into the electric power grid. Various energy storage methods to accommodate the intermittent nature of these resources. Economic constraints, environmental benefits and institutional regulations.

Note:

Prerequisite: EEE 130
Enforced at Registration: Yes No

Corequisite:
Enforced at Registration: Yes No

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

Course Classification (e.g., lecture, lab, seminar, discussion):
Lecture **Title for CMS (not more than 30 characters):**
Renewable Elec Energy Sources

Cross Listed?
Yes No **If yes, do they meet together and fulfill the same requirement, and what is the other course.**

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

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/afac/example.htm>

Students will learn:

1. Renewable electrical energy processes
2. Methods of storing energy
3. The design process and compliance certification of energy sources with applicable standards and regulations
4. The process of transfer of electrical energy to the power grid

**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:

Homework assignments

Two midterms and a final

Paper reviews

For whom is this course being developed?

Majors in the Dept x 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 x

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 x

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). None

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:

	Date
Department Chair: <i>John Chaluburg (for S.V.)</i>	5/9/09
College Dean or Associate Dean: <i>John Chaluburg</i>	5/9/09
CPSP (for school personnel courses ONLY)	
Associate Vice President and Dean for Academic Programs	

CONDITIONAL
APPROVAL *5/11/09*

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

EEE 135 - Renewable Electrical Energy Sources and their Integration with Grid:

Course Description:

The study of existing sources of renewable electrical energy such as wind, solar, geothermal, hydro, tidal, wave power, and biomass. Emphasis will be on wind and solar energy sources and their integration into the electric power grid. Various energy storage methods will be studied to accommodate the intermittent nature of these resources. Renewable electrical energy resources will be studied given the economic constraints, environmental benefits and institutional regulations.

Topics Covered:

- 1) Principles of sustainable renewable energy resources. (1 week)
- 2) Solar electrical applications. (1 week)
- 3) Photovoltaic generation sources, systems, and applications. (3 weeks)
- 4) Wind-based electric power generation. (1 week)
- 5) Electric power generation from renewable energy sources by using synchronous and asynchronous generators. (2 weeks)
- 6) Transfer of the electrical power to the transmission/distribution systems by using converter systems. Protection and voltage/frequency control of the developed power. (3 weeks)
- 7) Electric storage systems and transmission issues of the produced power. (1 week)
- 8) Production of electric power from hydrogen, biomass and geothermal resources. (1 week)
- 9) Production of electric power from wave and tidal power. (1 week)
- 10) Economic and environmental issues involving renewable electric energy production. (1 week)

Course Objectives:

1. Learn the principles of renewable energy and development.
2. Understand energy storage methodologies.
3. Learn photovoltaic generation sources, systems, and applications.
4. Learn the principles of wind power applications for electric power production.
5. Learn hydropower, geothermal power, biomass, wave, and tidal power for the purpose of electric generation.
6. Learn solar electrical power generation principles.

Evaluation:

Homework, paper reviews, 2 midterms, and a final.

Text and References:

- 1) Renewable Energy Resources, 2nd ed. By John Twidell and Tony Weir. Taylor and Francis 2006.
- 2) Grid Integration of Wind Energy Conversion Systems, 2nd ed. By Siegfried Heier. Wiley 2009
- 3) Wind and Solar Energy (2nd ed) by Mukand Patel.
- 4) Renewable Energy in Power Systems by Leon Freris and David Infield. Wiley 2008.