APPLICATION FOR NEW COURSE

1. Submitted by the College of Engineering Date: April 28, 2008

   Department/Division proposing course: Electrical and Computer Engineering

2. Proposed designation and Bulletin description of this course:

   a. Prefix and Number EE 531

   b. Title* Alternative and Renewable Energy Systems

   *If title is longer than 24 characters, offer a sensible title of 24 characters or less: Alternative Energy Sys.

   c. Courses must be described by at least one of the categories below. Include number of actual contact hours per week..

   (___) CLINICAL (___) COLLOQUIUM (___) DISCUSSION (___) LABORATORY (_3_) LECTURE

   (___) INDEPEND. STUDY (___) PRACTICUM (___) RECITATION (___) RESEARCH (___) RESIDENCY

   (___) SEMINAR (___) STUDIO (___) OTHER – Please explain: _____

   d. Please choose a grading system: ☑ Letter (A, B, C, etc.) ☐ Pass/Fail

   e. Number of credit hours: 3

   f. Is this course repeatable? YES ☐ NO ☑ If YES, maximum number of credit hours: _____

   g. Course description:

   Study of non-traditional, electric generating systems, and the use of renewable energy sources. Energy sources include solar, wind, hydro, and biomass/biogas. Generating technologies include both inverter based equipment and rotating machinery.

   h. Prerequisite(s), if any:

   EE 415G, Engineering Standing or consent of instructor.

   i. Will this course also be offered through Distance Learning? YES ☐ NO ☑

   If YES, please check one of the methods below that reflects how the majority of the course content will be delivered:

   Internet/Web-based ☐ Interactive video ☐ Extended campus ☐

3. Supplementary teaching component: ☑ N/A or ☐ Community-Based Experience ☐ Service Learning ☐ Both

4. To be cross-listed as: _____ (Prefix and Number) MORTORIUM ON APPROVAL OI / (printed name) Cross-listing Department Chair (signature)

5. Requested effective date (term/year): Fall / 2008

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6. Course to be offered (please check all that apply): ☑ Fall ☑ Spring ☐ Summer

7. Will the course be offered every year? ☐ YES ☑ NO

If NO, please explain: Student demand and instructor staffing.

8. Why is this course needed?

Discusses renewable and energy technologies and application. Enhances Power Engineering Curriculum. Extremely popular course.

9. **a.** By whom will the course be taught? Dr. Paul Dolloff

b. Are facilities for teaching the course now available? ☑ YES ☐ NO

If NO, what plans have been made for providing them?

10. What yearly enrollment may be reasonably anticipated?

40 students per class offering; 80 students if taught two semesters per year.

11. **a.** Will this course serve students primarily within the department? ☑ Yes ☐ No

b. Will it be of interest to a significant number of students outside the department? ☐ YES ☑ NO

If YES, please explain.

12. Will the course serve as a University Studies Program course†? ☐ YES ☑ NO

If YES, under what Area?

†AS OF SPRING 2007, THERE IS A MORTORIUM ON APPROVAL OF NEW COURSES FOR USP.

13. Check the category most applicable to this course:

☐ traditional – offered in corresponding departments at universities elsewhere

☐ relatively new – now being widely established

☑ not yet to be found in many (or any) other universities

14. Is this course applicable to the requirements for at least one degree or certificate at UK? ☑ Yes ☐ No

15. Is this course part of a proposed new program? ☐ YES ☑ NO

If YES, please name:

16. Will adding this course change the degree requirements for ANY program on campus? ☐ YES ☑ NO

If YES‡, list below the programs that will require this course:

‡In order to change the program(s), a program change form(s) must also be submitted.

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17. ☑ The major teaching objectives of the proposed course, syllabus and/or reference list to be used are attached.

18. ☑ Check box if course is 400G or 500. If the course is 400G- or 500-level, *you must include a syllabus showing differentiation* for undergraduate and graduate students by (i) requiring additional assignments by the graduate students; and/or (ii) the establishment of different grading criteria in the course for graduate students. (See *SR 3.1.4)*

19. Within the department, who should be contacted for further information about the proposed new course?

Name: Dr. Paul Dolloff Phone: 859-745-9389 Email: Paul.Dolloff@ekpc.coop

20. Signatures to report approvals:

August 21, 2008	Dr. Larry Holloway	Reported by Department Chair	
DATE of Approval by Department Faculty	printed name		signature
Nov 20, 2008	RICHARD J. SWEIGARD	Reported by College Dean	
DATE of Approval by College Faculty	printed name		signature
2/10/2009		Sharon Gill	
* DATE of Approval by Undergraduate Council	printed name	Reported by Undergraduate Council Chair	signature
Approved by GC 5/1/09			
* DATE of Approval by Graduate Council	printed name	Reported by Graduate Council Chair	signature
* DATE of Approval by Health Care Colleges Council (HCCC)	printed name	Reported by Health Care Colleges Council Chair	signature
* DATE of Approval by Senate Council		Reported by Office of the Senate Council	
* DATE of Approval by University Senate		Reported by Office of the Senate Council	

Digitally signed by Sharon Gill
DN: cn=Sharon Gill, o, ou=Undergraduate Education, email=sgill@uky.edu, c=US
Date: 2009.03.04 11:32:52 -05'00'

*If applicable, as provided by the *University Senate Rules*

Course Syllabus

EE 531 – Alternative and Renewable Energy Systems
SPRING 2008
Tue & Thur 5:00 - 6:15
Classroom: 207 RGAN: R. G. Anderson, Mechanical Engineering Building

Instructor: Paul A. Dolloff, Ph.D.
Office: FPAT 585

Contact Information

Email: Paul.Dolloff@ekpc.coop (NOTE: ".coop")
Phone 859/745-9389 work (direct)
859/744-4812 work (operator)
859/749-2524 cellular
859/527-3501 home
859/744-6008 FAX

Textbook

There is no official textbook for this course. Relevant reading material will be on file in the Engineering Library – third floor, Anderson Tower.

Outcomes

Basic understanding of alternative electric generating systems including:

1. Understanding of renewable energy sources and associated generating technologies
2. Understanding of Net Metering and associated interconnection issues
3. Ability to evaluate and design a PV system
4. Ability to evaluate and design a utility grade wind farm installation
5. Basic understanding of small hydro and landfill gas generating systems

Lecture Topics

1. Renewable Energy Sources
   a. Solar
      i. Solar cell and photovoltaic basics
      ii. Locating the sun
      iii. Expected insolation and effects of PV mounting angle
   b. Wind
      i. Wind data evaluation techniques
      ii. Wind machine modeling
      iii. Utility grade wind farm evaluation

    c. Hydro
        i. Micro-hydro
        ii. Pumped storage
        iii. Waste gas
2. Generating Technologies
    a. Fuel Cells
    b. Microturbines
    c. Energy Storage
3. Interconnection Issues
    a. Customer Load Characteristics
    b. IEEE Standard
    c. On-grid and off-grid considerations
4. Other Issues
    a. Economic dispatch (transmission)
    b. SCADA and metering
    c. Rates

Field Trip
There will be a field trip to East Kentucky Power Cooperative to be scheduled during a class period. The trip will include a lecture on economic dispatch and a tour of the EKPC 24-hour dispatch center.

Rates Lecture
This course may include a guest lecture program discussing the process by which an electric utility requests a rate change – a request to charge the customer more or less for electricity. This class period will include a mock hearing as if being held before the Kentucky Public Service Commission.

Examinations
There will be two (2) exams and a final exam; there is no mid-term exam. The first two exams will be scheduled during the course of the class and may be in take-home form. The final exam will be either given during, or will be due on, the University's scheduled time. In either case, the final exam will be comprehensive.

Makeup exams will be allowed only after receiving permission from the instructor prior to the exam's scheduled time.

Project
There will be one class project. Students will design a photovoltaic (PV) system for a residential customer. Project details will be given during the course. The student is responsible for performing research, specifying equipment, drawing a one-line diagram, estimated energy production by month, defining costs, determining the pay back period, and writing a final report.

Homework
Periodically, homework assignments will be made and collected for grade.

Attendance
Attendance shall not be taken; however, attendance is strongly encouraged as much of the course material will be taken from the instructor's notes and experiences.

Graduate Credit
Additional assignments will be given to those students registered for graduate course credit. These additional assignments will be a combination of 20% additional homework and an extended analysis requirement to the class project.

Grade Weightings
Each assignment carries the following overall course percentage:

Exam 1	20%
Exam 2	20%
Final Exam	20%
Project	30%
Homework	10%

Grading System
Unless the performance or circumstances associated with a particular student indicate otherwise, the final grade in the course will be based on the following scale:

	Undergraduate	Graduate
90-100	A	A
80-89	B	B
70-79	C	C
60-69	D	E
Below 60	E	E