PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

ALTERNATIVE ENERGY CONVERSION
EET 2940

Class Hours:  0                Credit Hours:  2
Laboratory Hours:  4          Date Revised:   Spring 2011

Catalog Course Description:

This course provides an introduction to a variety of residential and commercial distributed generation technologies, with an emphasis on photovoltaic systems. Topics include the basic understanding of direct current and alternating current systems, on-grid and off-grid systems, electrical generation techniques, load assessment, system sizing, system installation, and applications for this technology. In addition, the course introduces the student to other alternative energy conversion techniques, including wind technology, fuel cells and other methods.

Entry Level Standards:

Students entering this course must have college-level math skills.

Prerequisites:

EET 1012 or consent of instructor.

Corequisites:

None

Textbook(s) and Other Course Materials:


I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture: Introduction to Power Systems: Generation, Transmission, Distribution</td>
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<tr>
<td>2</td>
<td>Lecture: Overview of Energy Alternatives &amp; Distributed Generation</td>
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<tr>
<td>3</td>
<td>Lecture: DC/AC Circuits</td>
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<tr>
<td>4</td>
<td>Lecture: AC Systems</td>
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<tr>
<td>5</td>
<td>Lecture: AC Generation Principles</td>
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<tr>
<td>6</td>
<td>Lecture: Introduction to Photovoltaic Systems</td>
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<tr>
<td>7</td>
<td>Lecture: System Components and Configurations</td>
</tr>
<tr>
<td>8</td>
<td>Lecture: Photovoltaic Cells &amp; Arrays</td>
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</tbody>
</table>
II. Course Goals*:

The course will

A. Understanding basic electricity. (I, II, IV, V)
B. Understanding of basic units of electricity. (I, II, IV, V)
C. Understanding the generation, transmission, and distribution of electricity. (I, II, IV, V)
D. Understanding electrical generation principles. (I, II, IV, V)
E. Understanding distributed generation principles. (I, II, IV, V)
F. Understanding solar concepts. (I, II, IV, V)
G. Identifying the components of a Photovoltaic system. (I, II, IV, V)
H. Sizing a Photovoltaic system. (I, II, IV, V)
I. Understanding the difference between on-grid and off-grid systems. (I, II, IV, V)
J. Understand fundamentals of various co-generation techniques. (I, II, IV, V)
K. Understanding application safety risks when working with residential power generation. (I, II, IV, V)
L. Develop professionally written reports and presentations. (I, II, III, IV, V)
M. Complete projects in a timely manner. (I, II, III, IV, V)

*Roman numerals after course objectives reference goals of the Engineering Technology program (Career Program Goals and General Education Goals are listed http://www.pstcc.edu/departments/curriculum_and_instruction/syllabi/)

III. Expected Student Learning Outcomes*:

Students will be able to:

1. Explain the theory of electricity. (A, B)
2. Explain the basic terminology and units of electricity. (A, B)
3. Explain and apply basic electrical equations. (A, B)
4. Explain the characteristics of series and parallel circuits. (A)
5. Define AC & DC power and typical sources of each. (A)
6. Define the principle of "electromagnetic induction". (A)
8. Explain the principles of transformer operation. (A, C)
9. Identify the methods of energy conversion. (A, C, D, E, F, G, I)
10. Understand solar behavior and how solar energy can be harnessed. (E)
11. Explain the components of a solar photo-voltaic power generation system. (E, F, G)
12. Explain on-grid and off-grid principles. (G)
13. Understand the technical specifications for PV modules: Open circuit voltage, short circuit current, maximum power voltage, maximum power current, etc… (D, E, F, G)
14. Understand the temperature effects on PV module’s electrical parameters. (D, E, F, G)
15. Perform a site assessment for a solar PV system. (D, E, F, G)
16. Understand shading effects on PV systems. (F, G)
17. Understand the application of single phase residential power systems. (A, C, D, F, G, H, I, J)
18. Identify the different utilization voltages for residential and commercial power systems. (A, C, D, F, G, H, I, J)
19. Perform a load assessment for a Photo-Voltaic system. (F)
20. Explain the advantages and disadvantages of wind power. (J)
21. Identify areas that are ideal for wind generation. (J)

* Capital letters after Expected Student Learning Outcomes reference the course goals listed above.

IV. Evaluation:

A. Testing Procedures: 80% of grade

Exams 40%
Homework and Quizzes 20%
Final Exam 20%

B. Laboratory Expectations: 20% of grade

The laboratories for all EET courses are an essential part of conveying the concepts to the student. The labs will closely follow the classes in content and in time of presentation so that the student is actually verifying concepts learned in class. A laboratory report will be required for each lab. The laboratory grade will be determined by a combination of performance within
the lab and the quality and demonstrated comprehension of the lab report. There will be at least ten labs during the semester to go along with the classroom material.

C. Field Work:

None

D. Other Evaluation Methods:

None

E. Grading Scale:

<table>
<thead>
<tr>
<th>Score Range</th>
<th>Grade</th>
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<tbody>
<tr>
<td>93 - 100</td>
<td>A</td>
</tr>
<tr>
<td>88 - 92</td>
<td>B+</td>
</tr>
<tr>
<td>83 - 87</td>
<td>B</td>
</tr>
<tr>
<td>78 - 82</td>
<td>C+</td>
</tr>
<tr>
<td>70 - 77</td>
<td>C</td>
</tr>
<tr>
<td>60 - 69</td>
<td>D</td>
</tr>
<tr>
<td>Below 60</td>
<td>F</td>
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V. Policies:

A. Attendance Policy:

Pellissippi State expects students to attend all scheduled instructional activities. As a minimum, students in all courses (excluding distance learning courses) must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course. Individual departments/programs/disciplines, with the approval of the vice president of the Learning Division, may have requirements that are more stringent. In very specific circumstances, an appeal of the policy may be addressed to the head of the department in which the course was taken. If further action is warranted, the appeal may be addressed to the vice president of the Learning Division.

B. Academic Dishonesty:

Academic misconduct committed either directly or indirectly by an individual or group is subject to disciplinary action. Prohibited activities include but are not limited to the following practices:

- Cheating, including but not limited to unauthorized assistance from material, people, or devices when taking a test, quiz, or examination; writing papers or reports; solving problems; or completing academic assignments.
- Plagiarism, including but not limited to paraphrasing, summarizing, or directly quoting published or unpublished work of another person, including online or computerized services, without proper documentation of the original source.
- Purchasing or otherwise obtaining prewritten essays, research papers, or materials prepared by another person or agency that sells term papers or other academic materials to be presented as one’s own work.
- Taking an exam for another student.
- Providing others with information and/or answers regarding exams, quizzes, homework or other classroom assignments unless explicitly authorized by the instructor.
- Any of the above occurring within the Web or distance learning environment.

C. Accommodations for disabilities:

Students who need accommodations because of a disability, have emergency medical
information to share, or need special arrangements in case the building must be evacuated should inform the instructor immediately, privately after class or in her or his office. Students must present a current accommodation plan from a staff member in Services for Students with Disabilities (SSWD) in order to receive accommodations in this course. Services for Students with Disabilities may be contacted by going to Goins 127, 132, 134, 135, 131 or by phone: 539-7153 or TTY 694-6429. More information is available at www.pstcc.edu/departments/swd/.

D. Other Policies: