PELLISSIPPI STATE TECHNICAL COMMUNITY COLLEGE
MASTER SYLLABUS

MECHANICAL SYSTEMS II W/ LAB
CET 2322 (formerly CET 2320)

Class Hours: 2.0  Credit Hours: 3.0
Laboratory Hours: 3.0  Revised: Spring 05

Catalog Course Description:

The basic principles of electricity, wiring principles, multiphase systems, lighting fundamentals and energy management control systems.

Entry Level Standards:

Students entering this course should have sufficient mathematical skills, to manipulate various algebraic equations, and basic skills of communication to allow for the comprehension and presentation of technical data.

Prerequisites:

Second-year status

Textbook(s) and Other Course Materials:

Text:
Electrical Wiring Residential, Mullin, Delmar
National Electrical Code
Mechanical and Electrical Systems in Construction and Architecture, Dagostino, Prentice Hall

Other:
- Scientific Calculator
- Paper
- Pencil

I. Week/Unit/Topic Basis:

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<th>Week</th>
<th>Topic</th>
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| 1    | Lecture: Introduction  
      | Lab: Ohm's Law / Power Equation |
| 2    | Lecture: Ohm's Law / Power Equation  
      | Lab: Series / Parallel Circuits, (12 volts) |
| 3    | Lecture: Series / Parallel Circuits  
      | Lab: Generator Inspection |
| 4    | Lecture: Alternating / Direct Current; Exam 1  
      | Lab: 120 Volt Lighting Circuit |
Lecture: Electromagnetic Induction; AC/DC Generators
Lab: 3-Way / 4-Way Switches

Lecture: Single / Three Phase Power & Transformers
Lab: Electrical Wiring Module (dismantle, project planning)

Lecture: Electrical Conductors
Lab: Branch Circuit Design & Wiring

Lecture: Conductor Insulation
Lab: Branch Circuit Design & Wiring

Lecture: Wiring Methods; Exam 2
Lab: Branch Circuit Design & Wiring

Lecture: N.E.C. Requirements for Grounding
Lab: Service Entrance Design & Wiring

Lecture: N.E.C. Requirements for Receptacle, Lighting Circuits & Special Purpose Receptacles
Lab: Service Entrance Design & Wiring

Lecture: N.E.C. Requirements for Service Entrance; Exam 3
Lab: Electrical Wiring Module, (completion)

Lecture: Illumination Design & Florescent Lighting
Lab: Illumination design project

Lecture: HVAC Loads
Lab: Open

FINAL EXAM

II. Course Objectives*

A. Understand basic electricity. A, I, L
B. Understand basic units of electricity. A, I, L
C. Exhibit a basic understanding of the generation and distribution of electricity. A, I, L
D. Explain the common electrical wiring methods. A, C, I
E. Explain the "N.E.C" and other regulations which govern electrical installations. A, C, G, J, L, N
G. Recognize the characteristics of related industrial power systems or non-power systems. A, G, I, J, L, N
I. Demonstrate self initiative to complete all assignments on time. E

*Letters after course objectives reference CET Program Outcomes (as required by ABET).
III. Instructional Processes*:

Students will:

1. Actively listen to class lectures and participate in class activities that develop and reinforce comprehension of the theories, concepts, principles and applications of distance measurement using surveying instruments. Communication Outcome, Technological Literacy, Outcome, Active Learning Strategies

2. Observe class demonstrations on the proper use of tools and equipment and then integrate cognitive and manipulative skills to successfully complete laboratory assignments. Technological Literacy Outcome, Mathematics Outcome, Active Learning Strategies

3. Work individually and in teams to complete lab assignments related to the theories, concepts and principles covered in the lecture portion of the course. Communication Outcome, Technological Literacy Outcome, Active Learning Strategies

4. Demonstrate the ability to interpret and apply the NEC to electrical circuits. Technological Literacy Outcome, Mathematics Outcome

5. Collect, analyze and tabulate data in an orderly format using EXCEL Spreadsheets, WordPerfect/Word or other appropriate software. Communication Outcome, Technological Literacy Outcome, Mathematics Outcome, Active Learning Strategies

*Strategies and outcomes listed after instructional processes reference TBR’s goals for strengthening general education knowledge and skills, connecting coursework to experiences beyond the classroom, and encouraging students to take active and responsible roles in the educational process.

IV. Expectations for Student Performance*:

Upon successful completion of this course, the student should be able to:

1. Explain the theory of electricity. A, F, G
2. Explain the basic terminology and units of electricity. A, B, F, G
3. Explain the basic electrical equations. A, B, F, G
4. Explain the characteristics of series and parallel circuits. A, B, C, D, F, G
5. Define AC & DC current and typical sources of each. A, C, G
6. Define the principle of "electromagnetic induction". A, C, G
7. Explain the phase-time relationship between cycles of an alternating current. A, C, G
8. Demonstrate the principles of transformer operation. A, C, G
9. Demonstrate the standard methods of sizing electrical conductors. A, C, D, E, F, G
10. Explain the common design factors which affect conductor ampacity. A, B, C, D, E, F, G
11. Define conductor insulations, designations and characteristics. A, B, C, D, E, F
12. Demonstrate the methods of electrical wiring, applications and characteristics of each. D, E, F, G
13. Explain the methods of conductor enclosures, applications and characteristics. D, E, F, G
14. Explain the concept of "grounded" electrical conductors. C, D, E, F, G
15. Demonstrate the concept of "equipment grounding." C, D, E, F, G
16. Explain the "N.E.C." regulations governing color coding. C, E, F, G
17. Demonstrate how to wire the standard types of snap switches used to control electrical circuits. C, D, E, F, G
18. Demonstrate how to wire the standard types of electrical receptacles. C, D, E, F, G
19. Demonstrate how to wire the standard types of lighting outlets & fixtures. C, D, E, F, G
20. Demonstrate the common methods of providing overload protection to electrical circuits. C, D, E, F, G
21. Explain the "N.E.C." regulations governing the design of feeder and branch circuits. C, D, E, F, G
22. Explain the "N.E.C." regulations governing the design of service entrance components. C, D, E, F, G
23. Explain the "N.E.C" regulations governing the installation of electrical circuits and fixtures. C, D, E, F, G
24. Explain the procedures for illumination design. B, C, F, G
25. Explain the concept of fluorescent lighting. C, F, G

*Letters after performance expectations reference the course objectives listed above.

V. Evaluation:

A. Testing Procedures:

Four examinations are scheduled. They will be True/False, Multiple Choice, Matching, Short Answer Essay and Problem Solving.
Examinations will normally be given as scheduled. Should a student have a planned vacation, operation, etc. occur during a scheduled exam, every effort should be made to take the exam prior to the scheduled absence. When a student misses an exam due to illness, he must contact the instructor immediately upon return and make-up the exam within one week.
There will be a lab field final - no make-up.

B. Laboratory Expectations:

Teams will present a circuit drawing at the beginning of each laboratory exercise. Upon approval of the drawing by the instructor, each team shall gather the necessary tools, equipment and materials to perform the assignment. Each team will wire the circuit which will be inspected for compliance with N.E.C and tested for functionality. Grades will be based upon neatness and completeness of the drawing and upon the neatness and completeness of the wiring in a workman like manner.

Quizzes:
Quizzes may be given by the instructor. Most quizzes will be un-scheduled and randomly
given. They cover the previous session’s materials or the reading assignment for that day. There is no make-up or extra credit given for quizzes missed.

Homework:
One written assignment will be required. The written assignment will consist of a synopsis of an article, taken from a periodical. Students are free to pick their own topic, as long as it relates directly to electrical systems. Students may also be required to hand in answers to select questions at the end of each chapter or other appropriate homework at the instructor’s discretion. All written assignments must be handed in on 8 1/2 x 11” engineering notepad paper, paper with smooth edges, or forms provided by your instructor.
All written assignments will be assessed a 10% penalty for each school day it is late.
All student work submitted for evaluation may be retained by the instructor.

C. Field Work:
N/A

D. Other Evaluation Methods:
A subjective evaluation based on attendance, classroom participation and attitude may be included.

E. Grading Scale:

CLASSROOM (55-60%)
Final grades will be computed from the grades obtained on homework, quizzes and examinations as follows:
Quizzes & Homework = 10% - 20%
Examinations = 40% - 50%
LAB (40-45%)
Final grades will be determined by grades obtained on lab exercises. Each exercise is graded on completeness, and code compliance.

Grades are based on the following:
90 - 100 A
85 - 89 B+
80 - 84 B
75 - 79 C+
70 - 74 C
60 - 69 D
Below 60 F

VI. Policies:

A. Attendance Policy:
Pellissippi State Technical Community College expects students to attend all scheduled instructional activities. As a minimum, students in all courses must be present for at least 75 percent of their scheduled class and laboratory meetings in order to receive credit for the course (Pellissippi State Catalog). Individual departments/programs/disciplines, with the approval of the vice president of Academic and Student Affairs, may have requirements that are more stringent.
It is the student’s responsibility to attend every scheduled class activity on time.
Students are responsible to get assignments missed and to make-up any work missed during an absence.
B. Academic and Classroom Misconduct:

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. In addition to other possible disciplinary sanctions that may be imposed as a result of academic misconduct, the instructor has the authority to assign either (1) an F or zero for the assignment or (2) an F for the course.

C. Accommodations for disabilities:

If you need accommodation because of a disability, if you have emergency medical information to share, or if you need special arrangements in case the building must be evacuated, please inform the instructor immediately. Privately after class or in the instructor's office.

To request accommodations students must register with Services for Students with Disabilities: Goins 127 or 131, Phone: (865) 539-7153 or (865) 694-6751 Voice/TDD.