PELLISSIPPI STATE COMMUNITY COLLEGE
MASTER SYLLABUS

MECHANICAL SYSTEMS I W/LAB
CET 2310

Class Hours: 3.0 **Credit Hours: 4.0**

Laboratory Hours: 3.0 **Revised: Spring 2013**

Catalog Course Description:

The basic design principles of hydraulics; water distribution; sewage systems; fire sprinkler systems; and heating, ventilation and air conditioning 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. Previous courses in fluid distribution design would be beneficial but not necessary.

Prerequisites:

Second-year status

Textbook(s) and Other Course Materials:

Text:
Heating, Cooling, Lighting, Lechner, Wiley
Alternate Text:
Mechanical & Electrical Systems in Buildings, Tao, Prentice Hall.
Reference:
2006 International Plumbing Code, International Code Council
ASHRAE Handbook, ASHRAE Publishing.
Other:
- Scientific Calculator
- Paper
- Pencil

I. Week/Unit/Topic Basis:

Week	Topic	Chapter
1	Lecture: Introduction and Historical Passive Solar Appl. Lab: OPEN	1
2	Lecture: Sustainable Design Lab: TBA	2
3	Lecture: Basic Principles and Thermal Comfort Lab: TBA	3 & 4

4	Lecture: Climate and Solar Geometry Lab: TBA	5 & 6
5	Lecture: Passive Heating and Cooling - - EXAM 1 Lab: TBA	7 & 10
6	Lecture: Photovoltaics and Active Solar Lab: TBA	8
7	Lecture: Shading and Light Colors Lab: TBA	9
8	Lecture: Lighting and Electric Lighting Lab: TBA	12 & 14
9	Lecture: The Thermal Envelope Lab: TBA	15
10	Lecture: Mechanical Equip. for Heat and Cool - EXAM 2 Lab: TBA	16
11	Lecture: Water Supply and Distribution Lab: TBA	Handouts
12	Lecture: Drain, Waste and Venting Lab: TBA	Handouts
13	Lecture: Fire and Smoke Alarm Systems Lab: TBA	Handouts
14	Lecture: Storm Water Lab: Design Project	
15	FINAL EXAM	

II. Engineering Technology General Outcomes (Educational objectives)

I.	Apply basic engineering theories and concepts creatively to analyze and solve technical problems
II.	Utilize with a high degree of knowledge and skill equipment, instruments, software, and technical reference materials currently used in industry.
III.	Communicate effectively using developed writing, speaking, and graphics skills.
IV.	Assimilate and practice the concepts and principles of working in a team environment.
V.	Obtain employment within the discipline or matriculate to a four year program in engineering or industrial technology

III. Engineering Technology Concentration Competencies*

Students will:

A.	Apply the knowledge, techniques, skills, and modern tools for the concentration of study to specifically defined engineering technology activities

B. Demonstrate the knowledge of mathematics, science, engineering and technology to engineering technology problems using developed practical knowledge

C. Conduct and report the results of standard tests and measurements, and conduct, analyze and interpret experiment or project results

D. Function effectively as a member of a technical team

E. Identify, analyze and solve specifically defined engineering technology-based problems

F. Employ written, oral and visual communication in a technical environment

- At the program level all 6 competencies apply to roman numerals I – V of the Engineering Technology General Outcomes (Educational objectives) listed above.

IV. Course Goals*:

The course will

1. Expand the student's understanding of how passive heating and cooling systems influenced architectural design in the past. A & E

2. Expand the student's understanding of environmental impact of conventional energy sources. A & E

3. Expand the student's understanding the effects of climate on building design. A & E

4. Enhance the student's knowledge of the proper design of a passive heating and cooling system. A, B, D & E

5. Enhance the student's knowledge of the proper design of an active heating and cooling system. A, B, D & E

6. Expand the student's understanding of the range of plumbing materials, fittings, and means of connection commonly used in residential and commercial piping systems. A

7. Enhance the student's knowledge of the proper design of fire sprinkler distribution systems. A, B, D & E

8. Enhance the student's knowledge of the International Plumbing Code A

*Capital letters after course goals reference the competencies of the Engineering Technology concentrations listed above.

V. Expected Student Learning Outcomes*:

Students will be able to:

a. Apply appropriate terminology for architecture systems that impacted heating, cooling and lighting in the past. 1

b. Identify the various energy sources and how design can reduce global warming. 2

c. Identify the basic principles of thermal comfort. 3 & 4

d. Explain how climate and microclimates influence envelope design. 1 - 5

e. Identify the basic components involved in design of passive solar heating systems. 1 & 4

f. Explain the basic principles of photovoltaics. 5

g. Identify the basic principles of passive cooling. 1 & 4

h. Describe the basic concepts of daylighting and electric lighting systems.1 & 5

i. Describe basic types of mechanical systems used for heating and cooling. 5

j. Identify and apply the codes governing building plumbing. 8

k. Identify and describe the basic materials used in plumbing, and the characteristics of each. 6

l. Apply the concept of fixture units as units of flow rate. 6 & 8

m. Design a water distribution system using appropriate charts and tables in the design calculations. 6 & 8

n. Identify the unique problems involving high-rise distribution systems. 6 & 8

o. Identify the plumbing requirements of a fire sprinkler system. 7

p. Apply the concept of drainage fixture units as units of flow rate. 6 & 8

q. Design a DWV system using appropriate charts and tables in the design calculations. 6 & 8

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

VI. Evaluation:

A. Testing Procedures:

Three examinations are scheduled. They will be True/False, Multiple Choice, Matching, and Short Answer Essay. The exams are given over the internet. Students normally have 1 week to complete the exam. When a student misses an exam, he must contact the instructor immediately upon return and make-up the exam within a few days.

B. Laboratory Expectations:

<u>Quizzes:</u>
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 topics, as long as they relate directly to fluid flow. 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. Labs:

Teams will be assigned for labs. A lab report will be required for each lab assigned.

D. Other Evaluation Methods:

A subjective evaluation based on attendance, classroom participation and attitude may be included.

E. Grading Scale:

CLASSROOM (65-70%)
Final grades will be computed from the grades obtained on homework, quizzes and examinations as follows:
Quizzes & Homework = 10% - 20%
Examinations = 15% - 20% Each
LAB (30-35%)
Final grades will be determined by grades obtained on lab projects and reports.

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

VII. 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 Academic Affairs, 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 Academic Affairs.

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.

Please see the Pellissippi State Policies and Procedures Manual, Policy 04:02:00 Academic/Classroom Conduct and Disciplinary Sanctions for the complete policy.

C. Accommodations for disabilities:

Students that 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 sending email to disabilityservices@pstcc.edu, or visiting Goins 127, 132, 134, 135, 131. More information is available at http://www.pstcc.edu/sswd/.

D. Other Policies:

Safety and Equipment Abuse:
Repeated safety violations will result in a reduction of final grade, at the instructor's discretion. Flagrant violations which result in equipment damage or personal injury could result in automatic failure of the course