Class Hours: 3.0  Credit Hours: 4.0
Laboratory Hours: 3.0  Revised: Fall 2015

Catalog Course Description:

The course focuses on integration of mechanical and electrical systems within a structure and interpretation of appropriate codes. Principles of heating/cooling/ventilation systems, principles of hydraulics, fire sprinkler systems, water distribution and sewage collections systems, including approaches to water efficiency are covered, as are principles of electricity, wiring methods, electrical circuit design, and energy efficiency.

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:
Mechanical and Electrical Systems in Architecture, engineering and Construction, Dagostino, Prentice Hall
Alternate Text:
Heating, cooling and Lighting, Lechner, Wiley
Reference:
Other:
- Scientific Calculator
- Paper
- Pencil

I. Week/Unit/Topic Basis:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture: Sustainable Architecture</td>
<td>Alt Text</td>
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<tr>
<td></td>
<td>Lab: OPEN</td>
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<tr>
<td>2</td>
<td>Lecture: Thermal, Environmental and comfort Concepts</td>
<td>1 &amp; 2</td>
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<td></td>
<td>Lab: TBA</td>
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<tr>
<td>Day</td>
<td>Lecture</td>
<td>Lab</td>
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<tr>
<td>4</td>
<td>Lecture: HVAC Equipment</td>
<td>Lab: TBA</td>
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<tr>
<td>5</td>
<td>Lecture: HVAC Equipment</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>6</td>
<td>Lecture: Solar Thermal Systems - EXAM 1</td>
<td>Lab: TBA</td>
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<tr>
<td>7</td>
<td>Lecture: Plumbing Fundamentals</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>8</td>
<td>Lecture: Plumbing Drainage</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>10</td>
<td>Lecture: Plumbing Drainage - EXAM 2</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>11</td>
<td>Lecture: Electricity Theory and Materials</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>12</td>
<td>Lecture: Electrical Design Principles</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>13</td>
<td>Lecture: Lighting</td>
<td>Lab: TBA</td>
</tr>
<tr>
<td>14</td>
<td>Lecture: Life Safety Systems</td>
<td>Lab: Design Project</td>
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<tr>
<td>15</td>
<td>FINAL EXAM</td>
<td></td>
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</table>

**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*

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 concentration 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 the effects of the fluid distribution systems on building design and the effects of the building design on fluid distribution systems. A,B,C,E

2. 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,B,C,D,F

3. Expand the student’s understanding of how the principles of fluid flow affects water/air distribution systems. A,B,C,E

4. Enhance the student’s knowledge of the proper design a passive heating and cooling system. A,B,C,D,F

5. Enhance the student’s knowledge of the proper design of open/closed air conditioning distribution systems. A,B,C,E

6. Enhance the student’s knowledge of the proper design of fire sprinkler distribution systems. A,B,C,D,F

7. Foster the ability to demonstrate self initiative to complete all assignments on time. A,B,C,D,E,F
*Letters after course objectives reference Engineering Technology Concentration Competencies listed above*.

**IV. Expected Student Learning Outcomes**:  
Student will be able to:

1. Explain the concept of fluid flow. 1,2,3,7
2. Identify and apply the codes governing building plumbing and air distribution systems. 1,2,3,4,5,7
3. Apply appropriate terminology. 1 - 7
9. Explain the criteria involved in fluid flow. 1,2,3,7
10. Explain the relationship between pipe size, fluid velocity, flow rate, and pressure. 1,2,3,7
11. Explain the concept of fluid flow continuity. 1,2,3,7
13. Identify and describe the basic materials used in plumbing, and the characteristics of each. 2
16. Identify and describe the basic types of valves and the characteristics of each. 2
17. Apply the concept of fixture units as units of flow rate. 1,3,7
18. Design a water distribution system using appropriate charts and tables in the design calculations. 1,2,3,7
19. Identify the unique problems involving high-rise distribution systems. 1,2,7
20. Identify the plumbing requirements of a fire sprinkler system. 1,2,6,7
21. Design a fire sprinkler system using appropriate charts and tables in the design calculations. 1,2,6,7
22. Describe the types of closed air conditioning distribution systems and the characteristics of each. 5
25. Describe the types of open air conditioning distribution systems and the characteristics of each.
26. Describe the basic components of a passive solar heating and cooling system. 4
27. Design a solar heating system. 4,7

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

**V. Evaluation**:  

A. Testing Procedures:  

Three 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.

B. Laboratory Expectations:
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 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. Field Work:
Students will work in teams to accomplish the assigned laboratory exercise.

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% Each
LAB (40-45%)
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

VI. 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.

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 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 Disability Services (DS) in order to receive accommodations in this course. Disability Services may be contacted by sending email to disabilityservices@pstcc.edu, or by visiting Alexander 130. More information is available at http://www.pstcc.edu/sswd/.