Course Number and Title: AET 236 Building Service Systems

Campus Location:
Georgetown, Dover, Stanton

Effective Date:
2018-52

Prerequisite:
ENG 101, MAT 153 or MAT 180, (AET 125 and CET 135 and AET 164) or (CET 135 and CET 125 and AET 164) or ACR 101

Co-Requisites:
None

Course Credits and Hours:
3.00 credits
2.00 lecture hours/week
2.00 lab hours/week

Course Description:
This course introduces the theory and practice involved in the design and construction of mechanical systems to include heating and air conditioning, plumbing, and electrical systems.

Required Text(s):
Obtain current textbook information by viewing the campus bookstore - https://www.dtcc.edu/bookstores online or visit a campus bookstore. Check your course schedule for the course number and section.

Additional Materials:
None

Schedule Type:
Classroom Course
Hybrid Course
Online Course

Disclaimer:
None

Core Course Performance Objectives (CCPOs):

1. Describe various sustainable guidelines, design practices, equipment, and other options available for buildings and building service systems. (CCC 2; PGC 2)
2. Describe and identify how energy flows through buildings, what factors contribute to building loads, and how all these factors contribute to total energy use. (CCC 2, 6; PGC 2, 3)
3. Describe and identify how climate conditions dictate design decisions. (CCC 2; PGC 1, 2, 3)
4. Describe and identify the basics of air movement and how air moves around a building as well as within a building. (CCC 1, 2; PGC 2, 4, 6)
5. Compare various electrical and natural lighting systems in buildings. (CCC 2, 5; PGC 2, 4, 5)
6. Compare the different types of water supply, wastewater removal, and fire suppression systems. (CCC 2, 5; PGC 2, 4)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

Measurable Performance Objectives (MPOs):
Upon completion of this course, the student will:

1. Describe various sustainable guidelines, design practices, equipment, and other options available for buildings and building service systems.
    1. List and describe active and passive building systems and elements included in the U.S. Green Building Council: Leadership in Energy and Environmental Design (USGBC: LEED) standards or similar.
    2. Give examples of and explain building orientation, passive building systems, and landscaping practices that result in decreased energy and resource costs for heating, cooling, electricity, and water.
    3. Name and explain active building systems that result in decreased energy and resource costs for heating, cooling, electricity, and water.
    4. Describe building service systems that may be available in the near future due to technology innovations, changes in regulations, or consumer acceptance that could result in further improvements in building sustainability and efficiency.
2. Describe and identify how energy flows through buildings, what factors contribute to building loads, and how all these factors contribute to total energy use.
    1. Define heat transfer basics, and explain how energy flows within buildings.
    2. Produce and interpret heating and cooling load charts.
    3. List and describe the factors and building components and systems that contribute to internal heat gain.
    4. Calculate heat loss and heat gain.
    5. Complete a conceptual energy analysis, and compare different design options.
    6. Make informed decisions about how to reduce energy use through building envelope constructions.
    7. Perform a whole building energy analysis to determine thermal properties of materials, transmission and infiltration losses for all spaces, and total building heat loss.
3. Describe and identify how climate conditions dictate design decisions.
    1. Explain how different climate metrics will impact design decisions.
    2. Use the psychometric chart to determine means and methods of achieving thermal comfort.
    3. Associate passive design strategies with climate conditions.
    4. Explain the basics of climate responsive buildings and how it affects energy efficiency.
4. Describe and identify the basics of air movement and how air moves around a building as well as within a building.
    1. Identify design strategies to enable and enhance natural ventilation within a building.
    2. Determine what types of natural ventilation are most applicable for a building type and the strategies to implement them.
    3. Explain the different methods and systems commonly used in heating, cooling, and dehumidifying buildings.
    4. Explain the various methods for ensuring clean and healthful air in buildings.
    5. Interpret heating, ventilation, and air conditioning (HVAC) systems on drawings.
5. Compare various electrical and natural lighting systems in buildings.
    1. Define how light is measured, and explain what factors contribute to desirable lighting levels.
    2. Determine how much light is needed to support the building program.
    3. List and describe various electrical components and code requirements.
    4. Develop a drawing of electrical wiring for both power and lighting.
    5. Identify techniques for using daylighting to offset energy demands and bring natural light into spaces.
    6. Conduct daylight analysis and study illuminance levels.
6. Compare the different types of water supply, wastewater removal, and fire suppression systems.
    1. List the various codes and regulations that ensure the quality of potable water.
    2. List and describe various water supply and wastewater systems, materials, components, and installation requirements.
    3. Determine the number of fixtures needed for a building.
    4. List codes and regulations governing plumbing installations.
    5. Produce a drawing of both a water supply and a wastewater removal system.
    6. Describe the various types of sprinkler systems and their uses.

Evaluation Criteria/Policies:
Students must demonstrate proficiency on all CCPOs at a minimal 75 percent level to successfully complete the course. The grade will be determined using the Delaware Tech grading system:

92	**–**	**100**	**=**	**A**
83	**–**	**91**	**=**	**B**
75	**–**	**82**	**=**	**C**
0	**–**	**74**	**=**	**F**

Students should refer to the Student Handbook - https://www.dtcc.edu/handbook for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

Final Course Grade:
Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Assignments (summative)	50%
Semester Project (summative)	25%
Tests (summative)	25%
TOTAL	100%

Core Curriculum Competencies (CCCs are the competencies every graduate will develop):

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):

1. Research and analyze existing site conditions.
2. Apply principles of sustainability to the built environment.
3. Employ the architectural design process.
4. Interpret and apply building codes.
5. Create technical drawings and presentation graphics.
6. Demonstrate a commitment to quality, timeliness, professional development, and continuous improvement.

Disabilities Support Statement:
The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the disabilities services - https://www.dtcc.edu/disabilitysupport web page or visit the campus Advising Center.