



Course Number and Title: ACR 204 Residential Heating II

Campus Location:

Georgetown

Effective Date:

2018-51

Prerequisite:

ACR 105, ENG 102 or concurrent, MAT 120

Co-Requisites:

None

Course Credits and Hours:

3.00 credits

2.00 lecture hours/week

2.00 lab hours/week

Course Description:

This course covers heat loss estimation, design, and install for hydronic heating systems. Hot water baseboard heating systems are discussed with emphasis placed on methods of construction, balancing, and boiler designs.

Required Text(s):

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore.

Check your course schedule for the course number and section.

Additional Materials:

Basic Calculator

Schedule Type:

Classroom Course

Disclaimer:

None

Core Course Performance Objectives (CCPOs):

1. Examine physical properties and design considerations relevant to heating. (CCC 5, 6; PGC 2, 7)
2. Identify piping considerations for hydronic heating systems. (CCC 1, 2; PGC 2, 5, 7)
3. Apply concepts related to hydronic heating system components. (CCC 1, 2, 3; PGC 1, 2)
4. Prepare a complete hydronic system design layout. (CCC 1, 4, 6; PGC 3, 4, 6, 7)
5. Evaluate operation, construction, and design methods available for radiant floor systems. (CCC 6; PGC 2)

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. Examine physical properties and design considerations relevant to heating.
 1. Perform heat loss calculations using the short form method.
 2. Calculate heat loss for an entire building and for individual rooms.
 3. Explain the design and construction differences between steel and cast iron boilers.
 4. Identify boiler ratings systems and considerations.
2. Identify piping considerations for hydronic heating systems.
 1. Construct piping diagrams using different piping methods.
 2. Explain how to determine gallons per minute (GPM) requirements for water flow.
 3. Size piping to match water flow.
 4. Locate and describe all plumbing components used in a hydronic heating system.
 5. Construct a hydronic system using the supply side pumping method.
 6. Describe what is meant by the phrase "point of no pressure change."
 7. Discuss how circulators produce head pressure.
3. Apply concepts related to hydronic heating system components.
 1. Identify hydronic system components used in residential systems.
 2. Explain the purpose and function of components throughout a hydronic system.
 3. Construct a hydronic system with its components parts using the conventional method.
 4. Identify the different types of circulator pumps used in residential systems.
 5. Explain circulator pump rating and sizing conventions.
 6. Demonstrate proper sizing and installation methods used for circulator pumps.
4. Prepare a complete hydronic system design layout.
 1. Identify all components required in a typical hydronic system.
 2. Construct a design layout and proper placement using required components.
 3. Calculate radiant component lengths according to room dimensions.
 4. Correctly size piping for the design layout.
 5. Explain the operation of aquastat boiler controls.
 6. Describe the operation of zone valves.
5. Evaluate operation, construction, and design methods available for radiant floor systems.
 1. Describe the operation of radiant floor heating systems.
 2. Discuss the design and construction methods for radiant floor heating systems.
 3. Determine proper water temperature and flow rate for differing floor types.
 4. Identify and explain the different types of controls and zoning methods used with radiant heating systems.

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](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.

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. Demonstrate professional behaviors that satisfy workplace expectations and include adherence to safety and environmental concerns related to the field.
2. Service commercial refrigeration and residential heating, ventilation, and air conditioning (HVACR) systems, and interpret related electrical wiring diagrams and schematics.
3. Apply theories of electricity and high and low voltage controls to the HVACR field.
4. Explain scientific principles as they relate to HVACR system operations.
5. Safely use tools, instruments, and equipment related to the HVACR industry.
6. Explain the principles of operation, service, and repair of residential HVACR and commercial refrigeration systems.
7. Identify best practices for proper installation of HVACR equipment and systems.

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](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.