

III. Statement of Course Need

- A. Technicians in the Environmental Control Technology field are vital to maintaining physical comfort within our residences. Understanding the design of typical heating systems are integral elements for the education of well-trained technicians in the Environmental Control Technology field.
- B. Extensive engineering-design work in the form of laboratory activities is necessary to familiarize students with load calculations, equipment selection, hydronic system design and selection of peripheral components proper of an HVAC system, and which are expected of candidates that want to enter this field of work. Lab activities include, but are not limited to: computerized engineering design software use, and familiarization with web-based equipment manufacturer engineering and specification documentation.
- C. This course generally transfers as a free elective, but it also serves as a Program Elective to Pennsylvania College of Technology for those students graduating with the AAS in Environmental Control Technology who are interested in pursuing B.S. degree at that institution.

IV. Place of Course in College Curriculum

- A. Free elective
- B. This course meets a program requirement for the A.A.S. Environmental Control Technology Program, and the Environmental Control Technology Certificate.
- C. Course transferability: a) for New Jersey schools go to the NJ Transfer website, www.njtransfer.org; b) For all other colleges and universities go to their individual sites.

V. Outline of Course Content

- A. Heat Loss Calculations
- B. Hot Water Heating Design: Series, One-Pipe and Two-Pipe Loops
- C. Analysis of Industry and Government Energy Ratings for Boilers
- D. Steam Heating Design: Gravity vs. Forced Return Systems for One and Two-Pipe Loops
- E. Radiant Heat Design: Using Monographs for the Estimation of Circuit Lengths and Surface Outputs
- F. Gas Piping Design
- G. Combustion Air Intake Design (Fresh-air for Proper Combustion)
- H. Vent Sizing Design
- I. Combustion Efficiency Analysis
- J. Geothermal Systems Design
- K. Design concepts of Domestic Hot Water Loads

VI. General Education and Course Learning Outcomes

A. General Education Learning Outcomes

At the completion of the course, students will be able to:

1. identify appropriate techniques to solve design problems regarding heating equipment (GE - NJ 4).
2. apply quantitative reasoning to issues related to the design of heating equipment (GE - NJ 2).

B. Course Learning Outcomes

At the completion of the course, students will be able to:

1. Estimate heat losses for residential and light-commercial applications
2. Identify correct heating equipment and peripheral components
3. Design gas distribution lines, fresh-air intake systems and venting systems as per industry standards and building construction codes
4. Analyze combustion efficiencies in a fossil-fueled heating environment

C. Assessment Instruments

The following assessment methods may be used:

1. Projects.
2. Exams.
3. Lab Performance.
4. Demonstrations.

VII. Grade Determinants

- A. Computer Lab performance.
- B. Homework.
- C. Exams.
- D. Class participation
- E. Projects.

Modes of Teaching and Learning used in the Course:

- A. Lecture/discussion.
- B. Small-group and individual work.
- C. Computer-assisted instruction.
- D. Laboratory work.
- E. Student Collaboration.

VIII. Text and Materials

Suggested Texts: I=B=R Guide – Residential Hydronic Heating Installation/Design

Reference Literature: Heat Loss Calculation Guide, Latest Edition, The Hydronics Institute, Inc.
Installation Guide, latest edition, Residential Hydronic (hot water and steam) Heating, Latest Edition, The Hydronics Institute, Inc.

Please note: The course outline is intended only as a guide to course content and resources. Do not purchase textbooks based on this outline. The RVCC Bookstore is the sole resource for the most up-to-date information about textbooks.

IX. Resources

- A. Reference books
- B. Environmental control manufacturers' performance and specification printed literature
- C. Access to OEM engineering websites (OEM= Original Equipment Manufacturer)
- D. Instructional videos/DVDs
- E. Laptops, engineering design software as well as manuals, and various environmental controls technology-shop instruments and testers available in the lab.

X. Honors Option

Not applicable