

RARITAN VALLEY COMMUNITY COLLEGE ACADEMIC COURSE OUTLINE

ECTC 206 – Residential HVAC Controls and Instrumentation

I. Basic Course Information

A. Course Number and Title: ECTC 206 – Residential HVAC Controls and Instrumentation

B. New or Modified Course: Modified

C. Date of Proposal: Fall 2022

D. Effective Term: Fall 2023

E. Sponsoring Departments: Business and Public Service Department

F. Semester Credit Hours: 4

G. Weekly Contact Hours: 6 Lecture: 3
Laboratory: 3
Out of class work per week: 7.5 hours

H. ☒ Prerequisite (s): ECTC 104 Electricity for Environmental Control II

☐ Corequisite (s): None

☐ Prerequisite (s) and Corequisite (s):

I. Additional Fees: Laboratory fees

J. Name and e-mail Address of
Department Chair: Tracy Rimple, Tracy.Rimple@raritanval.edu
Divisional Dean: Patrice Marks, Patrice.Marks@raritanval.edu



II. Catalog Description

Pre-requisite: ECTC-104 Electricity for Environmental Control Technology II.

This is an advanced course in electrical control systems for residential and light commercial HVAC, requiring that students have had either previous training or field experience in the areas of control and instrumentation for HVAC. This course focuses on residential applications beginning with concepts of automation and feedback for control loops, continuing with a presentation of operating principles of gas, oil and electric heating/cooling control systems and associated equipment, and finally exploring indoor air quality (I.A.Q.) issues. Training is provided in the operation, troubleshooting, diagnosis and repair procedures of mechanical and electrical malfunctions on boilers, furnaces, heat pumps, central cooling systems, humidifying &

dehumidifying equipment and peripheral devices, and in the operation, calibration and testing of such systems. A particular focus throughout this course is towards optimization of control logic for the purpose of energy conservation, via techniques such as thermostat programming, outdoor setback, staging and modulation of equipment components.

III. Statement of Course Need

- A. Technicians in the Environmental Control Technology field are vital to maintaining physical comfort within our residences. Understanding the controls and instrumentation utilized in typical comfort control systems are integral elements for the education of well-trained technicians in the Environmental Control Technology field.
- B. Extensive hands-on work in the form of laboratory activities is necessary to familiarize students with advanced electrical troubleshooting procedures and best-practices followed by professionals in the residential HVAC Controls Field and expected of candidates that want to enter this field of work. Lab activities include, but are not limited to: tool/tester/instrument familiarization and proper use techniques; circuit component identification, assembly/disassembly, troubleshooting and repair procedures.
- 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. Temperature Sensing and Thermostats
- B. Controls for Gas Fired Heating
- C. Gas Burner Ignition Controls
- D. Controls for Oil Fired Heating
- E. Warm Air Controls
- F. Energy Conservation Controls
- G. Central Air Conditioning Controls
- H. Residential Air Quality Systems
- I. Supplemental (Peripheral) Controls and Accessories

VI. Course Learning Outcomes

A. Outcomes

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

1. Troubleshoot HVAC controllers such as, but not limited to: Aquastats, Limits, Oil Primaries, Gas Valves.
2. Identify the type of ignition system a particular heating system has been fitted with and its components.
3. Proper Controller selection and programming so it is able to communicate with the system and application for which it was chosen (GE-4).

B. Assessment Instruments

The following assessment methods may be used:

1. Lab. projects.
2. Exams.
3. Homework.

VII. Grade Determinants

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

Modes of Teaching and Learning used in the Course:

- A. Lecture/discussion.
- B. Small-group work.
- C. Laboratory work.
- D. Student collaboration.

VIII. Text and Materials

Suggested Text: Honeywell Service Data Manual, Latest Edition, by Honeywell, 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. Safety equipment
- C. Sample comfort control system components
- D. Instructional videos/DVDs
- E. Various environmental controls technology-shop tools and testers available in the lab.

X. Honors Option

Not applicable