

# RARITAN VALLEY COMMUNITY COLLEGE ACADEMIC COURSE OUTLINE

## ECTC 207 – Commercial HVAC Controls and Instrumentation

### I. Basic Course Information

A. Course Number and Title: ECTC 207 – Commercial HVAC Controls and Instrumentation

B. New or Modified Course: Modified

C. Date of Proposal: Fall 2022

D. Effective Term: Spring 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 206 Residential HVAC Controls & Instrumentation

☐ Corequisite (s): none

☐ Prerequisite (s) and Corequisite (s):none

I. Additional Fees: Laboratory fees

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



### II. Catalog Description

*Prerequisite: ECTC 206 – Residential HVAC Controls and Instrumentation.* This is an advanced course in instrumentation and controls for Commercial HVAC. The student is introduced to pneumatic control systems and components commonly used in buildings to operate heating and air conditioning equipment. An introduction to electronic and to microprocessor-based controllers currently in use in commercial buildings, often known as DDC (Direct Digital Controllers), is provided. The student is expected to have had previous education (or training) in heating and air conditioning design, be familiar with basic conceptual knowledge of air conditioning processes and with electricity for Environmental Control Technology. 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 commercial settings. Understanding the controls and instrumentation utilized in typical commercial 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 commercial 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.
- C. Course transferability: a) for New Jersey schools go to the NJ Transfer website, [www.njtransfer.org](http://www.njtransfer.org); b) For all other colleges and universities go to their individual sites.

### **V. Outline of Course Content**

- A. Controls Fundamentals (Honeywell Commercial)
- B. Hydronic/Boiler controls for Commercial Applications (Honeywell Commercial, Weil McLain, Circuits Lab)
- C. Heat Pump Controls (Honeywell Control Pro)
- D. Air Handling and Building Airflow Systems Control Application (Honeywell Commercial)
- E. Psychrometrics and Economizer Training (Trane, Honeywell Commercial)
- F. Pneumatic Controls (Honeywell Commercial, Robertshaw/Siebe Controls)
- G. Electronic Control Fundamentals (Honeywell Commercial)
- H. Microprocessor-based/DDC Fundamentals (Honeywell Commercial)
- I. Chiller and Distribution System Control Applications

## **VI. Course Learning Outcomes**

### **A. Outcomes**

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

1. Demonstrate proficiency in his/her understanding of Heat Pump operation.
2. Describe Sequences of Operations in hydronic circuits.
3. Demonstrate proficiency in design and equipment selection procedures of Heat Pumps.
4. Perform psychrometric calculations (GE-2).

### **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: Engineering Manual of Automatic Controls for Commercial Buildings, latest edition, Honeywell, Inc.

References: Handouts given by the instructor.

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