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 2016

D. Effective Term: Fall 2017

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: 6 hours

H. Prerequisite: ECTC104 Electricity for Environmental Control Technology II - This prerequisite is for AAS students only; not a pre-requisite for Certificate students.

I. Laboratory Fees: Yes

J. Name and Telephone Number or e-mail Address of Department Chair: 
   Anne Marie Anderson, AnneMarie.Anderson@raritanval.edu

II. Catalog Description

Pre-requisite: ECTC-104 Electricity for Environmental Control Technology II. (The pre-requisite is for AAS students only; not a pre-requisite for Certificate students.)

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. 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 problems specific to controls and instrumentation used with comfort control systems (GE - NJ 4).
   2. Apply quantitative reasoning to issues related to controls and instrumentation utilized with comfort control systems (GE - NJ 2).

B. **Course Learning Outcomes**
   At the completion of this course, students will be able to:
   1. Discuss the variables that affect human comfort
   2. Apply understanding of thermostat performance in order to select the most effective thermostat for any equipment and the desired control logic combination
   3. Identify the main elements necessary for various forms of combustion and heat pump operation
   4. Explain what elements are required to ensure good indoor air quality

C. **Assessment Instruments**
   The following assessment methods may be used:
   1. Projects.
   2. Exams.
   3. Lab Performance.
   4. Demonstrations.

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**

   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