RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

ECTC 102 – Air Conditioning Systems Design

I. Basic Course Information

A. Course Number and Title: ECTC 102 – Air Conditioning Systems Design

B. New or Modified: Modified

C. Date of Proposal: Fall 2022

NEW

D. Effective Term: Spring 2023

E. Sponsoring Departments: Business and Public Service Department

F. Semester Credit Hours: 6

G. Weekly Contact Hours: 9 Lecture: 6
Laboratory: 3
Out of class work per week: 13.5 hours

H. ☐ Prerequisite (s): None
☐ 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
Divisional Dean: Patrice Marks, Patrice.Marks@raritanval.edu

II. Catalog Description

This course deals primarily with the application of the fundamentals of engineering to the practical design of air conditioning systems. The course begins with the concepts of human comfort and their dependence on the proper conditioning of air, continues with cooling load estimating, psychrometric analysis, indoor air quality issues, the design of the air distribution system, and the selection of the air conditioning unit and peripheral components. Throughout the semester the student is also trained in the use of engineering design software and computer-aided equipment selection software. Particular attention is given to understanding the inherent system inefficiencies that occur due to either over-or under-sizing air conditioning system components and their negative impact on energy consumption and equipment life expectancy. Students are

introduced to the impact of renewables and new technologies in the design of air conditioning systems. Students also practice writing short technical papers, emails, and making presentations to sharpen their technical communication skills. A key part of this course is learning to design HVAC systems for a single-family residence.

III. Statement of Course Need

A. Technicians in the Environmental Control Technology field are vital to maintaining physical comfort within our residences. Understanding and mastering Engineering Design procedures for cooling 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, duct 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 Transfer & the Conditioned Environment
B. Air and Human Comfort
C. Use Computerized Air Conditioning Load Program
D. Introduction to Lighting Load Surveys and Calculations
E. Equipment Selection – Heating, Cooling and Dehumidification in Forced Air Systems
F. Principles of Fluid Flow
G. The Air Distribution System – Designing Duct Systems
H. Selection of Registers, Diffusers and Grilles
I. Fire Protection, Cogeneration, and Renewables

VI. Course Learning Outcomes

A. Outcomes

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

1. Estimate heat gain for residential and light-commercial applications by calculating transmission, infiltration, and internal gains using Carrier Corporation Block Load Program (GE-4).
2. Select energy efficient heating and air conditioning equipment that meets the sensible and latent loads and identify state-of-the-art energy conserving and sustainable features or technologies including renewables that can be incorporated into a house.
3. Design an air conditioning system including registers and grilles and designing a duct distribution system.

B. Assessment Instruments

The following assessment methods may be used:

1. Projects.
2. Homework.
3. Exams.

VII. Grade Determinants

A. Computer Lab performance.
B. Homework.
C. Exams.
D. Class participation
E. Projects.
F. Written Assignments

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 Text: Bob's House – Understanding the Residential HVAC Design Process.
An ACCA Publication.

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