RARITAN VALLEY COMMUNITY COLLEGE
ACADEMIC COURSE OUTLINE

ECTC 101 – Refrigeration I

I. Basic Course Information

A. Course Number and Title: ECTC 101 – Refrigeration I

B. New or Modified: Modified

C. Date of Proposal: Fall 2022

NEW

D. Effective Term: Fall 2023

E. Sponsoring Departments: Business and Public Service Department

F. Semester Credit Hours: 6

G. Weekly Contact Hours: 9 Lecture: 3
Laboratory: 6
Out of class work per week: 9 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 is an entry-level course for students in the Environmental Control Technology field. Its purpose is to provide the student with a practical blend of technical theory and laboratory skill-building activities. The course content aims at developing in the student a solid foundation in the basics of thermodynamic theory as applicable to refrigeration, and in the operation of the most modern tools, instruments and equipment in current use by field service professionals during installation, troubleshooting, maintenance and service procedures on present day refrigeration and air-conditioning systems. An emphasis is given to developing the necessary skills for efficient troubleshooting, maintenance and service procedures that would optimize

system performance with the objective of maximizing energy efficiency as per equipment manufacturer recommendations.

III. Statement of Course Need

A. Technicians in the Environmental Control Technology field are vital to maintaining physical comfort within our residences. Understanding the structure, components and learning about troubleshooting techniques of typical refrigeration 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 service procedures and best-practice standards followed by professionals in the 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; system 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. Careers n HVAC&R
B. Hand Tools
C. Fasteners
D. Working with Copper Tubing
E. Working with Pipe
F. Soldering
G. Brazing and flame-cutting
H. Basic Thermodynamic Principles
I. Temperature and Pressure
J. Basic Refrigeration Cycle
K. Other System Components

L. Refrigerants
M. Zeotropic Blends
N. Refrigerant Recovery and Recycling
O. System Evacuation, Lean Detection and Recharging
P. Working with Metering Devices
Q. Special Purpose Valves
R. Troubleshooting Refrigerant Flow Controls
S. Compressors
T. Compressor Lubrication and Accessories
U. Introduction to Water Chillers

VI. Course Learning Outcomes

A. Outcomes

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

1. Identify the various mechanical components of a refrigeration and/or air-conditioning system and explain their principles of operation.
2. Understand and explain the concepts of Saturation, Superheat and Subcooling, be able to test refrigerant charge in air-conditioning systems using either the superheat or subcool methods using charts and/or digital Apps (GE-4).
3. Show proficiency in the use of a variety of instrumentation and/or service procedures such as, but not limited to the following: refrigerant scales, manifold gauges, vacuum pumps, recovery machines, leak detection, charging and evacuation techniques.

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. Homework.

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: Heating and Cooling Essentials, Latest Edition, by Jerry & LaDonna Killinger

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/manuals
B. Safety equipment
C. Welding, brazing and flame-cutting equipment
D. Sample refrigeration system components
E. Instructional videos/DVDs
F. Various environmental controls technology-shop tools and testers available in the lab.

X. Honors Option

Not applicable