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 2016

D. Effective Term: Fall 2017

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: 6 hours

H. Prerequisite: None

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 Descriptionyy

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, psychometric 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 trained throughout the semester in proper sizing techniques for system performance optimization and energy conservation.

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. Analysis of the Air Conditioning Load
D. 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 Grills

VI. General Education and Course Learning Outcomes

A. <u>General Education Learning Outcomes</u>
At the completion of the course, students will be able to:

1. Identify appropriate techniques to solve design problems with air conditioning equipment (GE - NJ 4).
2. Apply quantitative reasoning to determine and solve air conditioning issues resulting from improper selection of equipment and/or peripheral components in an HVAC design (GE - NJ 2).

B. Course Learning Outcomes

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

1. Generate heating and cooling load calculations.
2. Sketch an air distribution system, including duct sizing, register/grille/damper selection, fan-performance analysis and equipment selection.
3. Choose an effective combination of outdoor and indoor equipment to match the cooling needs of residential and commercial applications.
4. Analyze manufacturers' engineering literature for sizing and selecting system components.

C. Assessment Instruments

The following assessment methods may be used:

1. Projects.
2. Exams.
3. Lab Performance.
4. Demonstrations.

VII. Grade Determinants

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

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