STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

COURSE NUMBER – COURSE NAME
HVAC101 – Refrigeration 1

Created by: Stan Skowronek

Updated by:

Canino School of Engineering Technology
Department: Mechanical & Energy Systems
Semester/Year: Fall 2019
A. **TITLE:** Refrigeration 1

B. **COURSE NUMBER:** HVAC101

C. **CREDIT HOURS:** (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity)

   - # Credit Hours: 2
   - # Lecture Hours: 2 per week
   - # Lab Hours: per week
   - Other: per week

   Course Length: 15 Weeks

D. **WRITING INTENSIVE COURSE:** Yes ☐ No ☒

E. **GER CATEGORY:** None: ☒ Yes: GER
   *If course satisfies more than one:* GER

F. **SEMESTER(S) OFFERED:** Fall ☒ Spring ☐ Fall & Spring ☐

G. **COURSE DESCRIPTION:**

   The fundamentals of refrigerating and air conditioning equipment are the emphasis of this course. Students study the basic refrigeration cycle and the function of each component; compressor, condenser, evaporator and metering device. Use of hand and power tools is stressed in laboratory work. Students cut, bend, solder, braze, flare, and swage cooper tubing. Flowing nitrogen is stressed during brazing operations

H. **PRE-REQUISITES:** None ☒ Yes ☐ If yes, list below:

   **CO-REQUISITES:** None ☒ Yes ☐ If yes, list below:
I. **STUDENT LEARNING OUTCOMES:** *(see key below)*

By the end of this course, the student will be able to:

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>Program Student Learning Outcome [PSLO]</th>
<th>GER [If Applicable]</th>
<th>ISLO &amp; SUBSETS</th>
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<tbody>
<tr>
<td>1. Describe the components of a refrigeration system</td>
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<td>3-Found Skills ISLO ISLO</td>
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<td>2. Size an evaporator, condenser, and compressor</td>
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<td>3-Found Skills ISLO ISLO</td>
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<td>3. Identify refrigeration systems and their applications</td>
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<td>3-Found Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>4. Introduction to the components and theory of basic electrical circuits</td>
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<td>3-Found Skills ISLO ISLO</td>
<td>Subsets Subsets Subsets Subsets</td>
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<td>5. Determine the proper devices to measure temperature and pressure</td>
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<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
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</tbody>
</table>
| 1 | Communication Skills  
Oral [O], Written [W] |
| 2 | Critical Thinking  
Critical Analysis [CA], Inquiry & Analysis [IA], Problem Solving [PS] |
| 3 | Foundational Skills  
Information Management [IM], Quantitative Lit./Reasoning [QTR] |
| 4 | Social Responsibility  
Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T] |
| 5 | Industry, Professional, Discipline Specific Knowledge and Skills |

*Include program objectives if applicable. Please consult with Program Coordinator
J. **APPLIED LEARNING COMPONENT:**  
   Yes ☐  No ☒

   If YES, select one or more of the following categories:

   - [ ] Classroom/Lab
   - [ ] Internship
   - [ ] Clinical Placement
   - [ ] Practicum
   - [ ] Service Learning
   - [ ] Community Service
   - [ ] Civic Engagement
   - [ ] Creative Works/Senior Project
   - [ ] Research
   - [ ] Entrepreneurship
   - (program, class, project)

K. **TEXTS:**

   Auvil, Ronnie J., HVAC and Refrigeration Systems, ATP, 2015

L. **REFERENCES:**

M. **EQUIPMENT:** None ☐  Needed: Technical enhanced classroom

N. **GRADING METHOD:** A-F

O. **SUGGESTED MEASUREMENT CRITERIA/METHODS:**

   Exams, Quizzes, Homework

P. **DETAILED COURSE OUTLINE:**

1. Fundamentals of Refrigeration
   1.1. Heat and Heat Flow
   1.2. Temperature Measurement
   1.3. Pressure Measurement
   1.4. Heat Transfer
   1.5. Sensible and Latent Heat
   1.6. Energy Units
2. Refrigeration Tools and Materials
   2.1. Pipe and Tubing
   2.2. Pipe Fitting and Sizes
3. Hand Tools and Gages
   3.1. Instruments
   3.2. Refrigerants and Oils
   3.3. Service Valves
   3.4. System Evacuation
4. Basic Refrigeration Systems
   4.1. Fixed orifice
   4.2. Variable orifice
5. Compression Systems and Compressors
5.1. Compression Cycle -
5.2. Evaporators -
5.3. Filter-Driers -
5.4. Compressors -
5.5. Condensers -
5.6. Receivers -
5.7. Controls -
5.8. Compressor Types -
5.9. Motors -
6. Refrigerant Controls
6.1. AEV -
6.2. TXV -
6.3. Flash Gas and Superheat -
6.4. TEXV -
6.5. Solenoid Valves -
6.6. Equalizers -
6.7. Capillary Tubes -
6.8. Control Systems -
6.9. Differential and Range Adjustment -
6.10. Motor Controls -
6.11. Defrost Controls -
6.12. Checking, Testing, and Servicing Controls -
7. Refrigerants
7.1. Refrigerant Identification -
7.2. Pressure-Temperature Curves -
7.3. Group One Through Three Refrigerants -
7.4. Expendable Refrigerants -
7.5. Refrigerant Cylinders -
7.6. Using Pressure-Temperature Curves -
7.7. Refrigerant Applications -
7.8. Refrigeration Oil -
7.9. Changing Refrigerants -
7.10. New Refrigerants -
7.11. Ozone Protection-EPA Guidelines -

Q. LABORATORY OUTLINE: None ☒ Yes ☐