

**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:

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

- | | |
|---|--|
| <input type="checkbox"/> Classroom/Lab | <input type="checkbox"/> Civic Engagement |
| <input type="checkbox"/> Internship | <input type="checkbox"/> Creative Works/Senior Project |
| <input type="checkbox"/> Clinical Placement | <input type="checkbox"/> Research |
| <input type="checkbox"/> Practicum | <input type="checkbox"/> Entrepreneurship |
| <input type="checkbox"/> Service Learning | (program, class, project) |
| <input type="checkbox"/> Community Service | |

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