

**NORTHEAST COMMUNITY COLLEGE  
COURSE SYLLABUS**

**HVAC 1120  
BASIC REFRIGERATION PRINCIPLES LAB**

**FALL 2014**

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COURSE SYLLABUS**

**I. CATALOG DESCRIPTION:**

**COURSE NUMBER:** HVAC 1120

**COURSE TITLE:** Basic Refrigeration Principles Lab

**PRE-REQUISITES:** None

**CO-REQUISITES:** HVAC 1110

**DESCRIPTION:** Practical application in the process of brazing-soldering different metals, study of different hand tools and specialty equipment used on HVAC-R systems and proper installation of a basic refrigeration system.

**CREDIT/CONTACT HOUR DESIGNATION:**

Credits: 4    Lecture: 22.5    Lab: 112.5    Clinical: 0    Coop: 0

**TERM:** Fall 2014

**II. COURSE OBJECTIVES:**

Course will:

1. Demonstrate proper safety practices when working with HVAC refrigeration systems.
2. Demonstrate proper soldering/brazing techniques.
3. Demonstrate proper flaring techniques.
4. Identify the transfer of heat on refrigeration systems.
5. Identify the different refrigerants and where they are used.
6. Identify different hand tools and equipment.
7. Identify which fastener you need for the job.
8. Identify the different types of copper tubing.
9. Identify what compressors, condensers, evaporators, and metering series are and what their purpose is in the refrigeration cycle.
10. Demonstrate how to use a vacuum pump and what its purpose is.
11. Demonstrate how to use a refrigerant recovery/recycling/reclaiming machine and what its purpose is.
12. Demonstrate how to use proper charging tools and how to charge a system.
13. Demonstrate troubleshooting system.\*
14. Identify what tools can be calibrated and how to calibrate them.

\*Course objectives are directed toward enhancing the Fundamental Academic Competencies and Skills (FACS) in written communication, problem solving, social skills, and critical thinking.

### **III. STUDENT LEARNING OUTCOMES:**

The student will be able to:

1. Solder copper tubing.
2. Braze copper, steel, and brass.
3. Flare copper tubing.
4. Identify components on refrigeration systems.
5. Identify refrigerants.
6. Know how to use hand tools.
7. Know how to install refrigeration lines on a system.
8. Know how to wire a refrigeration system.
9. Know what type of oil is to be used with each refrigerant.
10. Know how to evacuate a system.
11. Know how to recover refrigerant from a system.
12. Know how to charge a system.
13. Know how to calibrate tools and components.
14. Analyze a refrigeration system and get all information needed to know if the system is operating properly.

### **IV. CONTENT/TOPICAL OUTLINE:**

- A. Section 1: Theory of Heat
  1. Unit 1: Theory
  1. Unit 2: Matter and Energy
  2. Unit 3: Refrigeration and Refrigerants
  
- B. Section 2: Safety, Tools, and Equipment, Shop Practice
  1. Unit 4: Theory
  2. Unit 5: Tools and Equipment
  3. Unit 6: Fasteners
  4. Unit 7: Tubing and Piping
  5. Unit 8: System Evacuation
  6. Unit 9: Refrigerant Management-Recovery/Recycling/Reclaiming
  7. Unit 10: System Charging
  8. Unit 11: Calibrating Instruments
  
- C. Section 9: Domestic Appliances (Optional)
  1. Unit 44: Domestic Refrigerators
  2. Unit 45: Domestic Freezers

### **V. INSTRUCTIONAL MATERIALS:**

- A. Required Text:

1. *Refrigeration and Air Conditioning Technology Lab Manual*, 6<sup>th</sup> Ed.  
Authors: Whitman, Johnson, Tomczyk, Silberstein.
2. *Practical Competencies Lab Book*  
Author: Cecil Johnson

## VI. METHOD OF PRESENTATION:

A. Methods of presentation typically include a combination of the following:

1. Demonstrations
2. Student task quiz
3. Informal lectures
4. Group discussions

## VII. METHOD OF EVALUATION:

A. Methods of evaluation typically include a combination of the following:

1. Manipulative skills on daily assignments
2. Attendance
3. Work habits; Safety skills
4. Working relations with other students
5. Participation with others, working together, clean up and dedication to do good work.
6. Competency skills exhibited through “hands-on” testing.

B. Grading Scale:

95 - 100	A+
90 - 94	A
85 - 89	B+
80 - 84	B
75 - 79	C+
70 - 74	C
65 - 69	D+
60 - 64	D
0 - 59	F

## VIII. COURSE REQUIREMENTS:

A. Attendance

1. Students are expected to attend class. Quizzes will be given and cannot be made up unless approval from instructor. If you cannot attend class, see or call instructor (phone number 402-844-7231). Your grade will start dropping by a letter grade for each day after three days.

B. Student Conduct

1. Students are expected to complete your own work. Students will also be expected to conform to the Student Code of Conduct that was handed out.

**C. Lab Attendance and Conduct**

1. Lab time is for completing lab assignments. Students are expected to attend all labs and work on assignments during lab time. Playing games and not attending the full lab time are inappropriate.

**D. Assignment Completion**

1. All assignments are to be completed by the assigned date. Late assignments will only be accepted with approval from the instructor. Late assignments will not be accepted if more than one week.

**IX. SUPPORT SERVICES:**

**A. Library Service:**

The Northeast Community College Library Resource Center provides students with tools to conduct scholarly research and increase knowledge. Through the library's subscription databases, students have access to millions of current and credible resources not available through Google, Yahoo, and other search engines. Links to online databases and the library's online catalog can be found at <http://www.northeast.edu/Library-Resources/>. Students who would like assistance in utilizing the library's resources are encouraged to contact the library for further information and personal service at 402-844-7131 or email [marylouise@northeast.edu](mailto:marylouise@northeast.edu).

**B. Disabilities:**

Students with a documented disability may be eligible for certain accommodations that support their success in the classroom. Please contact Mary Balaski, Disability Services Coordinator, for further information. Her office is located in CWC- 1263; also, she may be reached at 402-844-7343 or [mary@northeast.edu](mailto:mary@northeast.edu).

**C. Applied Technology Division Safety Statement**

Through the course of the semester you will be working with and around equipment that can be dangerous. The inherent dangers include both kinetic and potential energy; examples include, but are not limited to, high voltages, rotating equipment, high pressure hydraulics, compressed air, items that are heavy and/or hot, and the risk of fall or shock. Every effort has been made to minimize these risks and you will receive instruction and training as a part of this course (and related courses) in the proper safety procedures and equipment operation protocols. If you have a health condition or physical limitation that may affect you or another student's safety, you are to consult with the instructor prior to beginning to work with the equipment or undertaking a task involving the equipment. It is the student's responsibility to be able to follow all safety procedures and equipment operation protocols. Failure to abide by safety practices, procedures, or equipment protocols could result in serious injury or death. Failure to follow these safety practices / procedures or equipment

protocols will not be tolerated and the student could face student disciplinary action including reduction of grade and possible removal from the course. Removal from the course could also result in loss of credit for the course and affect a student's financial aid.

**X. INSTRUCTOR NAME AND CONTACT INFORMATION:**

**Instructor:** John Nelson

**Office:** Weller 128

**Phone:** 402-844-7231

**Email:** [johnn@northeast.edu](mailto:johnn@northeast.edu)

**Office Hours:** Posted



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