

**NEOSHO COUNTY COMMUNITY COLLEGE  
MASTER COURSE SYLLABUS**

**COURSE IDENTIFICATION**

Course Code/Number: HVAC 124

Course Title: HVAC Lab

Division:  Applied Science (AS)  Liberal Arts (LA)  Workforce Development (WD)  
 Health Care (HC)  Lifetime Learning (LL)  Nursing  Developmental

Credit Hour(s): 4

Effective Date: Fall 2014

Assessment Goal Per Outcome: 80%

**COURSE DESCRIPTION**

This course is the laboratory component of HVAC 122. This course is the application of knowledge learned in HVAC 122. Presenting the basic principles of heating, ventilation, and air conditioning, this course covers heat transfer, refrigeration, and pressure-temperature relationships. It teaches tools, materials, and safety precautions and depicts step-by-step procedures for soldering and brazing piping; covers the selection, preparation, joining, and support of copper and plastic piping and fittings. The course explains the operating principles of the different types of compressors used in comfort air conditioning systems and covers the refrigerants and oils commonly used in HVAC/R systems. It introduces the trainee to the leak detection, evacuation, recovery, and charging service procedures.

**MINIMUM REQUIREMENTS/PREREQUISITES AND/OR COREQUISITES**

HVAC 122-HVAC Fundamentals

**TEXTS**

The official list of textbooks and materials for this course is found on *myNeosho*.

<http://www.neosho.edu/ProspectiveStudents/Registration/CourseSyllabi.aspx>

## **GENERAL EDUCATION OUTCOMES**

1. Practice Responsible Citizenship through:
  - identifying rights and responsibilities of citizenship,
  - identifying how human values and perceptions affect and are affected by social diversity,
  - identifying and interpreting artistic expression.
2. Live a healthy lifestyle (physical, intellectual, social) through:
  - listing factors associated with a healthy lifestyle and lifetime fitness,
  - identifying the importance of lifetime learning,
  - demonstrating self-discipline, respect for others, and the ability to work collaboratively as a team.
3. Communicate effectively through:
  - developing effective written communication skills,
  - developing effective oral communication and listening skills.
4. Think analytically through:
  - utilizing quantitative information in problem solving,
  - utilizing the principles of systematic inquiry,
  - utilizing various information resources including technology for research and data collection.

## **COURSE OUTCOMES/COMPETENCIES (as Required)**

Students will be able to:

### **OUTCOME 1: Demonstrate technical skills associated with refrigerant piping.**

#### **Competencies:**

1. Comply with regulatory codes encountered in the HVAC trade.
2. Utilize HVAC schedules/drawings.
3. Demonstrate the precautions that must be taken when installing refrigerant piping.
2. Select the right tubing for a job.
3. Cut and bend copper tubing.
4. Safely join tubing by using flare and compression fittings.
5. Determine the kinds of hangers and supports needed for refrigerant piping.
6. State the basic safety requirements for pressure-testing a system.
7. Identify types of plastic pipe and state their uses.
8. Cut and join lengths of plastic pipe.
9. Demonstrate soldering and brazing techniques.

### **OUTCOME 2: Demonstrate an understanding of heat transfer principles.**

#### **Competencies:**

1. Explain how heat transfer principles occur in a cooling system, demonstrating an understanding of the terms and concepts used in the refrigeration cycle.
2. Calculate the temperature and pressure relationships at key points in the refrigeration

cycle.

3. Demonstrate the use of temperature- and pressure-measuring instruments to make readings at key points in the refrigeration cycle.
4. Identify commonly used refrigerants and demonstrate the proper procedures for handling these refrigerants.

### **OUTCOME 3: Demonstrate technical skills associated with cooling systems.**

#### **Competencies:**

1. Identify the major components of a cooling system and explain how each type works.
2. Utilize the major accessories available for cooling systems and explain how each works.
3. Utilized control devices used in cooling systems and explain how each works.
4. Install one or more the following HVAC systems and their components: (1) Residential, (2) Commercial, and/or (3) Industrial.

### **OUTCOME 4: Demonstrate troubleshooting techniques appropriate for refrigerant systems.**

#### **Competencies:**

1. Demonstrate refrigerant leak detection procedures.
2. Demonstrate refrigerant evacuation procedures.
3. Demonstrate refrigerant recovery procedures.
4. Demonstrate refrigerant charging procedures.
5. Apply trade math principles.

### **MINIMUM COURSE CONTENT**

The following topics must be included in this course. Additional topics may also be included.

1. Introduction to HVAC
2. Piping Practices for Refrigeration Systems
3. Methods for Joining Various Piping
4. Common Refrigerants and Oils
5. Recovery, Evacuation and Charging Refrigerant Systems
6. Leak Checking Refrigeration Systems
7. Procedures for Basic Installation and Maintenance

### **NCCER MODULES COVERED IN COURSE**

- 03101-07 Intro to HVAC
- 03103-07 Copper and Plastic Piping Practices
- 03104-07 Soldering and Brazing
- 03107-07 Intro to Cooling
- 03301-07 Refrigerants and Oils

- 03205-07 Leak Detection, Evacuation and Recovery
- 03212-07 Basic Installation and Maintenance

## **STUDENT REQUIREMENTS AND METHOD OF EVALUATION**

Evaluation of student performance is determined primarily from results of written and performance tests to validate mastery of course competencies. Due to the nature of the class, student participation, teamwork, courtesy, honesty, and adherence to safety policies are required.

### **GRADING SCALE**

Grades will be assigned based on the number of points earned by the student.

A	90-100%
B	80-89%
C	70-79%
D	60-69%
F	<60%

## **ASSESSMENT OF STUDENT GAIN**

Students will be assessed through written testing. Practical application will be assessed on the first attempt at the skill and again at the conclusion of the course. Comparison will determine the extent of student gain.

### **Attendance Policy**

1. NCCC values interactive learning which promotes student engagement in the learning process. To be actively engaged, the student must be present in the learning environment.
2. Unless students are participating in a school activity or are excused by the instructor, they are expected to attend class. If a student's absences exceed one-eighth of the total course duration, (which equates to one hundred (100) minutes per credit hour in a face-to-face class) the instructor has the right, but is not required, to withdraw a student from the course. Once the student has been dropped for excessive absences, the registrar's office will send a letter to the student, stating that he or she has been dropped. A student may petition the chief academic officer for reinstatement by submitting a letter stating valid reasons for the absences within one week of the registrar's notification. If the student is reinstated into the class, the instructor and the registrar will be notified. Please refer to the Student Handbook/Academic Policies for more information
3. Absences that occur due to students participating in official college activities are excused except in those cases where outside bodies, such as the State Board of Nursing, have requirements for minimum class minutes for each student. Students who are excused will be given reasonable

opportunity to make up any missed work or receive substitute assignments from the instructor and should not be penalized for the absence. Proper procedure should be followed in notifying faculty in advance of the student's planned participation in the event. Ultimately it is the student's responsibility to notify the instructor in advance of the planned absence.

## **ACADEMIC INTEGRITY**

NCCC expects every student to demonstrate ethical behavior with regard to academic pursuits. Academic integrity in coursework is a specific requirement. Definitions, examples, and possible consequences for violations of Academic Integrity, as well as the appeals process, can be found in the College Catalog, Student Handbook, and/or Code of Student Conduct and Discipline.

## **ELECTRONIC DEVICE POLICY**

Student cell phones and other personal electronic devices not being used for class activities must not be accessed during class times unless the instructor chooses to waive this policy.

## **NOTE**

Information and statements in this document are subject to change at the discretion of NCCC. Students will be notified of changes and where to find the most current approved documents.

## **ACCOMMODATIONS**

If you are a student with a disability who may need accommodation(s), in compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) of 1990, please notify the Dean of Student Services in the Student Services Office, Sanders Hall, 620-432-0304, on the Chanute Campus, or the Dean for the Ottawa and Online Campuses, 785-248-2798, on the Ottawa Campus as soon as possible. You will need to bring your documentation for review in order to determine reasonable accommodations, and then we can assist you in arranging any necessary accommodations.

## **NON-DISCRIMINATION POLICY**

The following link provides information related to the non-discrimination policy of NCCC, including persons with disabilities. Students are urged to review this policy.

<http://www.neosho.edu/Departments/NonDiscrimination.aspx>

## **SEXUAL MISCONDUCT POLICY (TITLE IX)**

At NCCC, it is the responsibility of an instructor to help create a safe learning environment in the classroom, including both physical and virtual classrooms. All instructors are considered mandatory reporters at NCCC, therefore any information regarding sexual misconduct that is shared by a student in one-on-one meetings with the instructor must be reported to appropriate personnel at the College. Instructors will keep the information private to the greatest extent possible, but it is not confidential. Generally, climate surveys, classroom writing assignments or discussions, human subjects research, or events such as Take Back the Night events do not provide notice that must be reported to the Coordinator by employees, unless the reporting party clearly indicates that they wish a report to be made.

The following link provides information related to the sexual misconduct policy of NCCC, including resources, reporting options, and student rights. Students are urged to review this policy.

<http://www.neosho.edu/TitleIX.aspx>

## **COURSE NOTES**