

**NEOSHO COUNTY COMMUNITY COLLEGE  
MASTER COURSE SYLLABUS**

**COURSE IDENTIFICATION**

Course Code/Number: HVAC 109

Course Title: Heating Systems Lab

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

Credit Hour(s): 5

Effective Date: Fall 2014

Assessment Goal Per Outcome: 80%

**COURSE DESCRIPTION**

This course is the laboratory component of HVAC 107. This course is the application of knowledge learned in HVAC 107. It focuses on heating fundamentals; the types of furnace designs and their components and presents the basic procedures for installing and servicing furnaces. It describes the tools and instruments used in trouble-shooting gas heating appliances and teaches the principles of fossil-fuel furnace venting; covers various types of iron and steel pipe and fittings and provides step-by-step instructions for cutting, threading, and joining ferrous piping. It additionally presents the operation and testing of electric furnaces and their components and reviews the operation of electric heating appliances. Also included in this course is the design, construction and joining of sheet metal ducting used in HVAC systems.

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

1. HVAC 102 General Construction/ Core Skills
2. HVAC 103 Electrical Fundamentals
3. HVAC 107 Heating System 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 techniques associated with heating systems and safety.**

#### **Competencies:**

1. Recognize the different fuel types used in various furnaces.
2. Identify different efficiency of furnaces.
3. Identify carbon monoxide safety violations.
4. Check gas pressures.
5. Inspect and perform standard seasonal maintenance and tune-up.

### **OUTCOME 2: Perform standard tests to assess the operation of heating systems.**

#### **Competencies:**

1. List sequence of operation.
2. Assess air flow/water flow.
3. Measure temperature split.
4. Check and adjust thermostat heat anticipators.
5. Perform start up procedures.

### **OUTCOME 3: Apply trade math and interpret mechanical drawings relevant to HVAC.**

#### **Competencies:**

1. Apply trade math to daily applications.
2. Interpret mechanical drawings, symbols, and their applications.

**OUTCOME 4: Install venting and measure air moving through it.**

**Competencies:**

1. Design and install venting for fossil fuel appliances.
2. Explain heating system design and functions.
3. Introduce airside and hydronic systems including various types of boilers, piping, chilled-water systems and their components.
5. Measurement and control of air temperature, humidity, pressure, and velocity.

**OUTCOME 5: Demonstrate maintenance and repairs of HVAC systems.**

**Competencies:**

1. Maintenance and repairs of various HVAC systems.
2. Introduce troubleshooting of heating, cooling, and heat pump systems.
3. Introduce troubleshooting of control circuits, electronic controls, and accessories.
4. Introduce troubleshooting of air quality and energy conservation equipment.

**OUTCOME 6: Utilize the appropriate types of metals and pipe joining methods.**

**Competencies:**

1. Identify the types of ferrous metal pipes.
2. Measure the sizes of ferrous metal pipes.
3. Identify the common malleable iron fittings.
4. Cut, ream, and thread ferrous metal pipe.
5. Join lengths of threaded pipe together and install fittings.
6. Describe the main points to consider when installing pipe runs.
7. Describe the methods used to join piping.

**MINIMUM COURSE CONTENT**

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

1. Introduction to Heating Systems
2. Combustion
3. Venting of Heating Equipment
4. Ferrous Metal Piping
5. Sheet Metal Duct and Piping
6. Air Flow Properties
7. Gas Furnace Operations
8. Troubleshooting Heating Systems

## 9. Introduction to Hydronic Systems

### **NCCER Modules Covered in Course**

- 03108-07 Intro to Heating
- 03105-07 Ferrous Metal Piping Practices
- 03202-07 Chimney's, Vents and Flues
- 03208-07 Intro to Control Circuit Troubleshooting
- 03209-07 Troubleshooting Gas Heating
- 03213-07 Sheet Metal Duct Systems
- 03214-07 Fiberglass and Flexible Duct Systems
- 03203-07 Intro to Hydronic Systems

### **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**