

**NEOSHO COUNTY COMMUNITY COLLEGE
MASTER COURSE SYLLABUS**

COURSE IDENTIFICATION

Course Code/Number: HVAC 208

Course Title: Commercial HVAC

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 covers the operation of refrigeration systems, with emphasis on systems used in cold storage and other commercial food preservation applications and presents the basic techniques and equipment used in troubleshooting these types of cooling equipment. It explains the operating principles of the different types of hydronic systems and offers the operating principles, applications, installation, and adjustment of the various types of hydronic systems. It presents the entire basic handling and equipment servicing procedures that a technician must know in order to service hydronic systems and covers the application and installation of various types of hydronic systems.

MINIMUM REQUIREMENTS/PREREQUISITES AND/OR COREQUISITES

HVAC 122- HVAC Fundamentals and HVAC 124- HVAC Lab

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

Students will be able to:

OUTCOME 1: Explain the types of commercial refrigeration systems.

Competencies:

1. Describe the mechanical refrigeration cycle as it applies to retail refrigeration systems.
2. Explain the differences in refrigerants and applications in low-, medium-, and high-temperature refrigeration systems.
3. Identify and describe the primary refrigeration cycle components used in retail refrigeration systems.
4. Identify and describe the supporting components and accessories used in retail refrigeration systems.
5. Describe the control system components used in retail refrigeration systems.
6. Explain the operating sequence of a retail refrigeration system.
7. Interpret wiring diagrams and troubleshooting charts to isolate malfunctions in retail refrigeration systems.

OUTCOME 2: Demonstrate an understanding of the application of commercial refrigeration systems.

Competencies:

1. Identify and describe the applications for the various types of retail refrigeration systems .
2. Describe the various methods of defrost used in retail refrigeration systems.

OUTCOME 3: Demonstrate an understanding of commercial hydronic systems.

Competencies:

1. Explain the terms and concepts used when working with hot-water heating and chilled-water cooling systems.
2. Identify the major components of hot-water heating, chilled-water cooling, and dual-temperature water systems.
3. Explain the purpose of each component of hot-water heating, chilled-water cooling, and dual temperature water systems.
4. Describe the safety precautions used when working with hot-water/chilled-water systems.
5. Explain the differences between reciprocating, rotary screw, scroll, and centrifugal chillers.
6. Identify the common piping configurations used with hot-water heating and chilled-water cooling systems.

OUTCOME 4: Demonstrate an understanding of water principles in hydronic systems.

Competencies:

1. Explain the reasons why water treatment programs are needed.
2. List symptoms in heating/cooling systems that indicate a water problem exists.
3. Describe the types of problems and related remedies associated with water problems that can occur in the different types of water and steam systems.
4. Recognize and perform general maintenance on selected mechanical types of HVAC equipment that are used to control and/or enhance water quality.

OUTCOME 5: Demonstrate an understanding of the procedures of starting up and shutting down a hydronic system.

Competencies:

5. Describe how to prepare a boiler for dry storage.
6. Describe how to prepare a boiler for wet storage.
7. Explain how to clean, start up, and shut down a steam boiler.
8. Explain how to clean, start up, and shut down a hot-water boiler.
9. Describe how to start up and shut down a reciprocating liquid chiller and related water system.
10. Describe how to start up and shut down a selected centrifugal or screw liquid chiller and related water system.
11. Describe how to start up and shut down an air handler and related forced-air distribution system.

MINIMUM COURSE CONTENT

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

1. Commercial and Industrial Refrigeration Cycle
2. Commercial and Industrial Refrigeration Applications

3. Methods for Installing Hydronic Systems
4. Examination of the Components in Hydronic systems
5. Water Treatment in Hydronic Systems
6. Maintenance of Hydronic Systems
7. Startup and shut Down of Hydronic Systems

NCCER MODULES COVERED IN COURSE

- 03109-07 Air Distribution Systems
- 03201-07 Commercial Airside Systems
- 03204-07 Air Quality Equipment
- 03302-08 Compressors
- 03303-08 Metering Devices
- 03210-07 Troubleshooting Cooling
- 03211-07 Heat Pumps

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