

Nichols Career Center

HVAC

Course Syllabus

Instructor: Rodney Berhorst

Conference Times: 10:55-11:45 am or after 3:00 pm

Nichols Career Center Number: 573-659-3100

Email: rodney.berhorst@jcschools.us

Website: www.nicholscareercenter.org; www.schooltube.com

COURSE DESCRIPTION:

This class is designed to provide occupational and technical information related to the construction industry. Basic skills taught in this class are safety, tool technology, fundamentals of refrigeration, electrical circuits and controls, installation and service of residential hermetic units, and basic sheet metal fabrication. The second year will complete an in-depth study into commercial systems, applications of those systems, and servicing and installing of the commercial systems. Advanced sheet metal fabrication is also part of the course. Students will also prepare for certification of Refrigeration Recovery and Recycling through the Clean Air Act.

Grades: 11-12

Credits: 4.0

Embedded Math for HVAC

This course presents informational methods of contextual mathematical instruction directly related to HVAC. Students will review pre-existing concepts and learn new concepts that are specific to the HVAC industry. Relative mathematics will prepare students for higher education or provide them with the knowledge necessary to enter directly into the trade. Students will complete various assignments but not limited to projects and problem solving activities. Additionally, students will practice Compass-prep objectives.

Grades: 11-12

Credits: 0.5

EMBEDDED COMMUNICATION ARTS FOR HVAC:

The Nichols Career Center Technical English program will capitalize on student interest in HVAC technology and practical experience in the shop. Students will be encouraged to choose topics related to HVAC technology and the workplace when conducting research and presenting information. (Please see additional information in the Technical English Syllabus)

Grades: 11-12

Credits: 0.5

PROGRAM GOAL:

All students will have a positive placement. Each student will complete the program prepared to advance to an entry-level position in the HVAC industry, enlist with the military, or attend a college or technical school.

TEXTBOOKS, RESOURCE MATERIALS, MEDIA SUPPORT, ETC:

Text book/workbook: Refrigeration and Air Conditioning Technology, Whitman, Johnson, Tomczyk, and Silberstein. Publisher: Delmar Cengage Learning; 2009

Instructional Materials Laboratory- ACR Electrical Systems. University of Missouri-Columbia, 1997

Instructional Materials Laboratory- Fundamentals of Air Conditioning/ Refrigeration. University of Missouri-Columbia, 1992

Instructional Materials Laboratory-Sheet Metal Basics. University of Missouri-Columbia, 1993

Instructional Materials Laboratory-Advanced Sheet Metal Fabrication. University of Missouri-Columbia, 1993

Modern Refrigeration and Air Conditioning. Althouse, Turnquist, Bracciano. Publisher: The Goodheart-Willcox Company, Inc. 1996

Electrical Power, Motors, Controls, Generators, and Transformers. Publisher: The Goodheart-Willcox Company, Inc. 1998

GRADING SYSTEM:

Categories:

- 15% Work Ethic, Classroom Performance
- 65% Quizzes, Tests, Projects
- 10% Embedded Math
- 10% Term Exam

Grade reports will be sent to students and parent(s)/guardian(s) of secondary students at the end of each nine-week period. The following grading scale is used.

93-100 A (Excellent Work)	80-82 B- (Superior Work)	67-69 D+ (Inferior Work)
90-92 A- (Excellent Work)	77-79 C+ (Average Work)	63-66 D (Inferior Work)
87-89 B+ (Superior Work)	73-76 C (Average Work)	60-62 D- (Inferior Work)
83-86 B (Superior Work)	70-72 C- (Average Work)	50-59 F (Failure)

INIncomplete work, no credit given until requirements are completed, which automatically becomes an "F" at the end of a semester, unless arrangements are made with the office.

WWithdrawn, passing work being done in a course dropped either by withdrawal from school or by permission of the director.

WFWithdrawn failing, failing work being done at the time of withdrawal OR course is dropped after the deadline for schedule changes.

COMMUNICATION PLAN:

Nichols Career Center has many opportunities for both students and guardians to stay up-to-date on the grades and assessment expectations of the course. My primary source is Infinite Campus, our grading system. You may log into Infinite Campus at any time to see the progress on assessments and assignments of the course. If ever there is a concern, please contact me by email craig.strope@jcschools.us or phone (573) 659-3118.

STUDENT YOUTH ORGANIZATIONS:

Skills/USA is the youth organization designed to develop the student's leadership abilities, in addition to his/her particular skill or trade, which will aid him/her in becoming a successful employee. It is also designed to create a common bond among all students. The Skills/USA organization is used to help the student learn about their community and the HVAC field.

CERTIFICATION:

CareerSafe's 10-Hour OSHA General Industry training program consists of 14 interactive modules discussing various safety tips and procedures one should follow while in the workplace. Each module contains a brief assessment, which must be successfully completed before the student can move on to the next module. Once all modules have been viewed and the corresponding assessments are passed there is a comprehensive final assessment.

The students also study for and are given the opportunity to pass the EPA 608 refrigerant handling license through HVAC Excellence. Section 608 of the US Federal Clean Air Act requires all persons who work with regulated refrigerants to be certified.

DRESS CODE/STUDENT EXPECTATIONS:

1. Hair, which is considered long by the instructor, will have to be tied back to prevent injury.
2. Jewelry, of any kind, attached to the hands and arms or piercings that are loose fitting this includes watches, rings, bracelets or any other item considered as dangerous in the lab by the instructor may not be worn in the shop.
3. Loose fitting clothing including shirt tails, loose sleeves, oversized blouses and/or skirts or dangling clothing including belts and shoelaces may not be worn in the shop.
4. The student will come to class prepared to work in the lab or take notes during lecture/demonstration. Everyone should be in his/her seat and ready to go when the bell rings.
5. Any student deemed by the instructor to be unfit due to a health reason, drugs, alcohol, or any other reason, will not be allowed to enter the lab or use any of the equipment, tools or material in the lab or classroom. The student is responsible for his/her actions and is responsible for the information regardless of his/her condition.
6. No beverages will be allowed in the lab area. Students will be allowed to bring snacks back to the classroom after break; however, this privilege can be taken away.
7. The proper procedures will be followed when operating all equipment and working on assignments. Remember, *safety always comes first!*

8. All students will be tested on the proper safety procedures to follow when using chemicals, operating equipment and general lab use. All students must pass the safety test before being allowed any lab privileges. .
9. All students will be taught and tested on how to access and read the Safety Data Sheets explaining the chemicals used in the class.
10. All incidences where students need to be corrected for any misconduct, horseplay, lack of consideration or disrespect for any reason will be documented in Infinite Campus.
11. All homework assignments will be due at the beginning of the class period unless otherwise stated.
12. All students will be treated with respect as an "employee" of the course. The instructor is the "employer". If the employer deems the employee as unacceptable, proper action will be taken according to course/school policy.
13. Internship students are required to call the school or instructor before 8:00 a.m. if they are not going to be in attendance. Students must make arrangements with the instructor to make up assignments.
14. All students will meet in the classroom on time and be properly dressed according to course/school policy. **NO OPEN TOED SHOES OR SHORTS ARE ALLOWED IN THE SHOP.**
15. It is the student's responsibility to get make-up assignments from the instructor. The student is allowed the same number of days to make up work as was missed. Lab assignments, projects and activities may be extended due to the availability of equipment.
16. All students are required to have a pair of safety glasses in order to be allowed in the lab area.

ESSENTIAL SKILLS:

First Year:

- Safety
- Use Gauge Manifold Set
- Leak Test System
- Recover Refrigerants
- Describe Operation of Refrigeration System Accessories
- Identify and Use Different Types of Tubing and Fittings
- Install and Replace PVC Tubing and Fittings
- Perform Gas Piping Operations
- Basic Electricity
- Control Wiring and Circuits
- Fabricate/Install Air Distribution Systems

RETURN POLICY FOR SECOND SEMESTER:

Students who are performing below average, or who are failing the semester are subject to removal from the program at semester. A student/parent conference will be held prior to the end of the semester with the appropriate individuals present and alternatives will be discussed.

CLASSROOM EXPECTATIONS: Act like a young adult and you will be treated as one! I enforce ALL school rules!

- **I expect each student to conduct themselves in an appropriate manner at all times in the classroom/shop.** Be respectful of the teacher, other students, and yourself. Use appropriate language, manage your own behavior, and accept responsibility for the consequences of negative behavior. Disruptive, disrespectful behavior will not be tolerated.
- **I expect each student to work hard at all times in the classroom/shop.** Abide by all safety rules, stay on-task at all times in order to complete your assignments, and take pride in your work. Take ownership in your learning.
- **I expect each student to pay close attention to my instruction.** Stay focused during reading, discussion, and instruction time. Follow instructions carefully. You may ask for further explanation, but do not ask me to repeat something because you were not paying attention.
- **I expect each student to succeed.** You have complete control over your academic success. I will help you succeed in any way I can. If you work hard, attend class regularly, complete assignments on time, abide by all safety rules, and take ownership in your learning, you will succeed. This is your education. You will take it with you when you leave here. Invest your time and energy in this valuable asset.

Other rules specific to my classroom:

- **BRING TO CLASS:** Pencil and Notebook
- Cell phones are not allowed in my class.
- iPads are allowed ONLY for educational purposes.

Students learn good work habits by performing daily tasks on furnaces and air conditioners. Students are expected to learn how to become a professional in the HVAC field, and practice this trait while learning their profession. Work here is graded by the instructor's judgment. The judgment is based on student's work habits and professionalism. Results have no bearing on grade unless students do not finish, or do not correct mistakes. Absent work, Make-up work, Late Work, Technology Expectations, Classroom/Shop Expectations, Dress Code, Damaged Textbook or Equipment etc, are in the student handbook.

MAKE-UP WORK

Regular attendance, coursework, and class participation is critical to the success of a student. As a training facility, the faculty of Nichols Career Center places a great deal of importance on daily attendance, coursework, and class participation. Many of the activities that occur within the programs offered at Nichols cannot be duplicated. To reflect the importance of regular daily attendance and class participation, the following grading procedure becomes effective on the first day of school.

- Students will be able to "make-up" the class participation grade for absences in the following manner. Within 2 school days from the absence, turn in a paper (one page per block period missed) relevant to the subject being taught on the day of the students absence.
- The paper must be legible and use correct grammar, spelling, and sentence structure.
- The cover page should include:
 - Name of student
 - Class missed and number of blocks
 - Date of absence
 - Parent/Guardian signature and daytime phone number
- A bibliography page must be included.
- If the instructor deems the paper unacceptable based on the above conditions, the instructor has the discretion whether to allow the student the opportunity to revise the assignment.
- School activities are not considered an absence for the student.
- It is up to the student to seek out the instructor for make-up work. The instructor will not in any way be responsible for making sure the student is making up the work.
- The paper will be a standard size (8 ½ X 11). The type should be no larger than 12 point. The paper should be double-spaced. If the paper is written by hand, each line of the page must be written on.
- As with all guidelines and procedures, there will be extenuating circumstances concerning make-up work. If the students find themselves in this position, they must have a conference with the instructor.

STUDENT SERVICES:

Student services are available to help students succeed in their classes. Students in technical programs are eligible for extra assistance by asking for help from their teacher or by having their teacher refer them to the Vocational Resource Educator. Career Planning is available to students who are looking for part-time or full-time jobs or need help with writing a resume. In addition, persons knowledgeable about financial aid for post high school training/education are available, as well as persons who can help students assess their vocational strengths and preferences in order to make more informed career choices.

Second Year:

- Safety
- Recover, Leak Test, and Recharge Systems
- Wire/Install/Replace Controls
- Install/Service/Troubleshoot Gas Furnaces
- Install/Service/Troubleshoot Electric Furnaces
- Install/Service/Troubleshoot Heat-Pumps
- Customer Relations/Soft Skills
- Troubleshoot Control Circuits

COURSE OUTLINE FIRST YEAR:

<u>Week</u>	<u>Topic</u>
1-3	Basic Information and shop safety
4	Start CareerSafe OSHA 10
4-9	Sheet metal fabrication
10-13	Piping principles and practices (black iron, copper, pvc)
14-15	Brazing and Soldering practices
16-18	Basic Electricity principles
19-21	Electrical circuits and projects
22	House wiring
23-26	Control wiring circuits (motors and controls)
27-28	Refrigeration Theory
29	Manifold gauges
30-31	Recovery, Evacuation, and Recharging
32	Refrigerant recovery license 608 study and testing
33-34	EOC Exams

COURSE OUTLINE SECOND YEAR:

<u>Week</u>	<u>Topic</u>
1-3	Basic Information and shop safety
4-6	Refrigeration Theory
7-11	Gas Furnace theory, installation and repair
12-13	Electric Furnace theory, installation and repair
14-16	Heat-Pump theory, installation and repair
17-18	Ground Source Heat-Pump theory, installation and repair
19-22	Troubleshooting theory and practice
23-26	Preventative maintenance and customer relations
27-30	Light commercial refrigeration theory and practice
31-33	EOC Exams

MASTER LIST OF COMPETENCIES: Available upon request.

