NORTHEAST COMMUNITY COLLEGE COURSE SYLLABUS

HVAC 2020 HEATING TECHNOLOGY LAB

FALL 2015

NORTHEAST COMMUNITY COLLEGE HEATING TECHNOLOGY LAB COURSE SYLLABUS

I. CATALOG DESCRIPTION:

COURSE NUMBER: HVAC 2020

COURSE TITLE: Heating Technology Lab

PRE-REQUISITES: HVAC 1210; HVAC 1220; HVAC 1250; HVAC 1260

CO-REQUISITES: HVAC 2010

DESCRIPTION: Practical applications of residential heating systems, including installation and service procedures for gas combustion and electric furnaces using variable speed technology.

CREDIT/CONTACT HOUR DESIGNATION:

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

TERM: Fall 2015

II. COURSE OBJECTIVES:

Course will:

- 1. Expose students to different application of conventional and high efficiency furnaces.
- 2. Provide various brands of electric and gas furnaces to become familiar with operational sequences.
- 3. Describe variable speed technology used in modern heating systems.
- 4. Demonstrate types of ignition systems used.
- 5. Follow electrical circuits using system schematics.
- 6. Describe problem solving techniques using furnace system diagnosis.
- 7. Learn to perform furnace maintenance.
- 8. Demonstrate proper installation procedures.
- 9. Explain the combustion process.
- 10. Explain safety and hazards related to combustion appliances.
- 11. Demonstrate operation of common instruments used in troubleshooting gas and electric furnaces.

III. STUDENT LEARNING OUTCOMES:

The student will be able to:

1. Identify several temperature-sensing elements and state why they respond to temperature changes.

- 2. Follow the circuit in a typical electric air handler or furnace and be able to list the specifications for these products.
- 3. Identify various types of electronic controls.
- 4. Understand the relationship between inputs and outputs on microprocessor controls.
- 5. Understand variable-speed technology used in heating and cooling products.
- 6. Properly adjust a heat anticipator in an electric furnace low-voltage control circuit.
- 7. Describe and draw diagrams illustrating the low voltage control circuits in single-and multi-stage electric furnaces.
- 8. Check and electric heating system by using a clamp-on ammeter to make sure that all heating elements are drawing power.*
- 9. Install gas furnace and use proper startup procedures.
- 10. Troubleshoot electrical problems in an electric furnace.*
- 11. Recognize and state the various components of a typical gas furnace.
- 12. Demonstrate an understanding of combustion theory.
- 13. Use tools and test equipment appropriately while following safety practices.
- 14. Look at the controls of a typical gas furnace and determine the type of pilot safety features used.
- 15. Perform routine maintenance on an atmospheric gas burner.
- 16. Perform combustion analysis on a gas furnace.
- 17. Determine the amount of air in CFM moving through a gas furnace using the air-temperature-rise method.*
- 18. Troubleshoot a simple problem in a gas furnace with spark ignition.*
- 19. Change a gas valve on a typical gas furnace using the correct tools and procedures.
- 20. Change a fan motor on a gas furnace and then restart the furnace.
- 21. Successfully troubleshoot a service problem in a gas furnace.*

*Student learning outcomes address goals established for the Fundamental Academic Competencies and Skills (FACS) in communication, social and cultural awareness, and critical thinking/problem solving.

IV. CONTENT/TOPICAL OUTLINE:

- A. Refrigeration & Air Conditioning Technology, 7th Ed.; Text and Lab Manual:
 - 1. Safety training review
 - 2. Unit 15: Troubleshooting basic controls
 - 3. Unit 30: Electric Heat with handouts
 - 4. Unit 31: Gas Heat with handouts
 - 5. Unit 32: Oil Heat

Assigned equipment wiring

- B. Heating, Ventilation and Air Conditioning Labs assigned
 - 1. Practical Competencies: Chapters 5 and 6, Oil and Gas Heat
 - 2. Theory Lessons: page 703. Practical Competencies 131-150 Oil Heat
 - 3. Theory Lessons: page 809. Practical Competencies 151-164 Gas Heat

V. INSTRUCTIONAL MATERIALS:

A. Required Text:

- Refrigeration & Air Conditioning Technology Study Guide/Lab Manual; 7th Ed. Authors: Whitman and Johnson
- 2. Practical Competencies, HVAC-R Lab Book

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.
- 7. Essays
- 8. Objective tests
- 9. Class Participation
- 10. Oral quiz
- 11. Performance on demonstration material
- B. Grading Scale:

95 - 100	A+
90 - 94	А
85 - 89	$\mathbf{B}+$
80 - 84	В
75 – 89	C+
70 - 74	С
65 - 69	D+
60 - 64	D
Below 60	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 402-844-7230). 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
 - 1. Lab time is for completing the 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 instructor. Late assignments will not be accepted if more than one week.
- E. Instructor Absence:
 - 1. If instructor is absent, see other instructor for details (John). Listen to radio for weather related school announcements.

IX. SUPPORT SERVICES:

A. 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 <u>mary@northeast.edu</u>.

B. Service Center:

Students may get assistance with computer-related problems through the College's Service Center; <u>help@northeast.edu</u>. It is strongly advised that a student participate in on-line training via a formal course or the on-line tutorials available through Northeast Community College's homepage; <u>http://northeast.edu/help/</u>

Email: help@northeast.edu Phone number: 402-844-HELP (4357) In person: The Service Center is located in the Library on the Norfolk campus Service Center Hours of Operation: Sunday 1:00 p.m. - 9:00 p.m. Monday - Thursday 7:00 a.m. to 10:00 p.m. Friday 7:00 a.m. to 5:00 p.m.

If you have technical questions regarding the My Classes Online environment you need to contact the Service Center. Questions regarding the course content need to be directed to the instructor via My Classes Online Course Mail (email).

C. Advising & Academic Support Center (CWC 1284)

This is a one stop shop for all students. Advisors are available to assist with schedules, career planning, transfer questions, change of majors, academic recovery and other issues impacting academic success. Located in CWC 1284, students will find a study space, lounge area and computers. Direct contact information is as follows:

Amanda Engelhart - 402.844.7125 or amandae@northeast.edu

- 1. Tutoring CWC 1284
- 2. Writer's Clinic CWC 1284

D. 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 <u>http://www.northeast.edu/Library-Resources/</u>. 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 <u>marylouise@northeast.edu</u>.

E. Title IX:

While I want you to feel comfortable coming to me with issues you may be struggling with or concerns you may be having, please be aware that I have reporting requirements that are part of my job requirements at Northeast Community College.

For example, if you inform me of an issue of sexual harassment, sexual assault, or discrimination I will keep the information as private as I can, but I am required to bring it to the attention of the institution's Title IX Coordinator. The Associate Vice President of Human Resources is the Title IX Coordinator and can be reached by calling 402-844-7046. You could also call the Vice President of Student Services at 402-844-7273. Additionally, you can report incidents or complaints to the Dean of Student Life by calling 402-844-7722.

Another common example is if you are struggling with an issue that may be traumatic or unusually stress producing, I will likely inform the Northeast Counseling Services office. If you would like to reach out directly to the Counseling Office, the contact number is 402-844-7277.

Finally, know that if, for some reason, our interaction involves a disruptive behavior or potential violation of policy, I will inform the Director of Student Conduct office even when you and I may have reached a resolution to the incident. The purpose of this is to keep the Director apprised of any concerning behaviors and what was done to resolve them.

F. 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: Mr. Paul Bailey Office: APT 145 Office Phone: 402-844-7230 Home Phone: 402-371-0394 (after 5:00pm) Email: paulb@northeast.edu Office Hours: Tuesday and Thursday 3:00PM – 4:00PM Monday & Wednesday 4:00PM – 5:00PM



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