NORTHEAST COMMUNITY COLLEGE
COURSE SYLLABUS

HVAC 2220
HEATING PUMP TECHNOLOGY LAB

FALL 2015

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COURSE SYLLABUS

I. CATALOG DESCRIPTION:

COURSE NUMBER: HVAC 2220

COURSE TITLE: Heating Pump Technology Lab

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

CO-REQUISITES: HVAC 2210

DESCRIPTION: This course provides instruction on the principles, application, and operation of residential air source and water source heat pumps. Topics include: installation procedures, servicing procedures, electrical components, geothermal ground source energy supplies, dual fuel, troubleshooting, valves and safety.

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. Identify and discuss different types of heat pumps.
2. Determine the differences between heat pumps and air conditioners.
3. Install and wire an air source heat pump.
4. Evacuate and charge heat pump using manufacture instructions.
5. Participate with others while installing heating and cooling system.
6. Use wiring schematics to troubleshoot and repair faults in system.
7. Program and set up thermostat for heating and cooling application.
8. Using manufactures charts to determine correct water flow on water source heat pump.
9. Describe how to check heat pump performance using temperatures, pressures and charts.
10. Understand proper use of common instruments and tools used when servicing heat pump.
11. Demonstrate procedures on how to check heat pumps in defrost, heating and cooling cycles.

III. STUDENT LEARNING OUTCOMES:

The student will be able to:

1. Identify and describe the typical components in an air-to-air heat pump system.

2. Demonstrate good customer relations in classroom simulation.*
3. Use appropriate tools and test equipment while following safety practices.
4. Make a heat pump performance check on a air-to-air heat pump with fixed- bore metering devices while it is in the cooling mode, and adjust refrigerant charge for desired performance.*
5. Read electrical wiring diagrams and demonstrate an understanding of wiring diagrams.
6. Follow the control circuits in the auxiliary and emergency heat modes in a heat pump system and measure the voltage at each terminal.
7. Develop a systematic way to diagnose system problems and demonstrate method in class.*
8. Check a four-way valve for internal gas leakage during the cooling mode.
9. Troubleshoot basic defrost problems in a heat pump.*
10. Use manufacture system charging tables.
11. Become familiar with water-to-air heat pump systems.
12. Check for the correct water flow through a coaxial heat exchanger on a geothermal heat pump.
13. Troubleshoot an electrical problem with the changing from cool to heat.*
14. Follow a wiring diagram and wire the field control wiring for a split system heat pump.
15. Verify system operation.*
16. Write service report.*

*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. Troubleshooting & Servicing Heat Pump Systems
   1. Chapter 1: Principles of Refrigeration
   2. Chapter 2: Heat Pump Operation
   3. Chapter 3: The Four-Way Valve
   4. Chapter 4: Heat Pump Electrical Operation
   5. Chapter 5: heat Pump Defrost System
   6. Chapter 6: Heat Pump Controls and Accessories
   7. Chapter 7: The Scroll Compressor
   8. Chapter 8: Heat Pump Service & Troubleshooting

B. Practical Competency HVAC text/lab book
   1. Chapter 4: Heat Pumps-Practical Competency 107-130

V. INSTRUCTIONAL MATERIALS:

A. Required Text**:**
   1. Refrigeration & Air Conditioning Technology, 7th Ed.
      Authors: Whitman and Johnson

   2. Troubleshooting & Servicing Heat Pump Systems
      Author: Richard Jazwin

3. Refrigeration & Air Conditioning Technology Study Guide/Lab Manual; 7th Ed.
   Authors: Whitman and Johnson

4. Practical Competencies, HVAC-R Lab Book

B. Required Materials
   1. Notebook
   2. Pen/Pencil
   3. Calculator
   4. Pressure-Temperature chart
   5. Safety glasses

VI. METHOD OF PRESENTATION:

A. Methods of presentation typically include a combination of the following:

1. Class room lecture and discussion of material.
2. Handouts of printed materials covered in class.
3. Audiovisual aids (transparencies, videos and computer multi-media).
4. Independent study (reading of handouts, textbooks and preparing for exams).
5. Informal lectures (casual communication of knowledge).
6. Demonstrations (the use of testing equipment).

VII. METHOD OF EVALUATION:

A. Methods of evaluation typically include a combination of the following:

1. Written tests 60%
2. Quizzes and Assignments 40%
3. Student evaluation is done through completed assignments, quizzes, and tests.
4. Jupiter Grades will be used to view assignments and grades.

B. Grading Scale:

95 - 100	A+
90 - 94	A
85 - 89	B+
80 - 84	B
75 – 89	C+
70 - 74	C
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.

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 mary@northeast.edu.

B. Service Center:
Students may get assistance with computer-related problems through the College's Service Center; help@northeast.edu. 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; http://northeast.edu/help/

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 http://www.northeast.edu/Library-Resources/. 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 marylouise@northeast.edu.

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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