Course Description: A study of procedures and principles used in servicing heating systems, including gas fired and electric furnaces. The student will be introduced to proper testing and troubleshooting techniques. The class will cover proper wiring, gas controls, thermostats, spark ignition, and venting procedures.

Prerequisites: HART 1401 or consent of instructor.

Text, References, and Supplies:
1. **REFRIGERATION AND AIR CONDITIONING**
3. Industry Literature

Course Goals/Objectives: This course will focus on the skills needed to perform maintenance and service for heating equipment. The student will learn the principles and components of heating equipment, including gas heat and electric heat. This course will stress application of skills in many lab exercises. The following list of course goals will be addressed in the course. These goals are directly related to the performance objectives.

(* designates a CRUCIAL Goal)

1. Display work habits.
2. Use safe work habits.
3. Explain combustion.
4. Define complete combustion.
5. Define incomplete combustion.
6. Explain combustion testing.
7. Describe heating fuels.
8. List furnace components
10. Explain outside combustion air requirements.
11. Explain primary air combustion requirements.
12. List three thermostat types.
14. Explain cooling anticipator operation.
15. Explain heating anticipator operation.
16. Use amp meter.
17. Use volt meter.
18. Measure anticipator current.
20. Calculate gas furnace CFM.
21. Explain gas piping requirements.
22. Explain standard furnace venting requirements.
23. Test gas furnace efficiency.
24. Measure temperature rise.
25. Clean burner chamber.
27. Explain electric heat only thermostat.
29. Explain burner orifice sizing.
30. Explain combustion air requirements.
31. Explain gas furnace safety controls.
32. Trace gas heat schematic diagram.
33. Identify gas furnace components.
34. Identify LP gas pressure requirements.
35. Identify natural gas pressure requirements.
36. Measure supply gas pressure.
37. Measure manifold gas pressure.
38. Adjust gas pressure.
39. Adjust burner flame.
40. Analyze types of flames.
41. Test pilot safety.
42. Test fan control.
43. Test limit safety.
44. Inspect heat exchanger.
45. Test flue draft.
46. Troubleshoot gas furnace.
47. Perform gas heat pre-season maintenance.
48. Read gas heat schematics.
49. Install gas valve.
50. Install fan control.
51. Explain 80+ furnace venting requirements.
52. Explain secondary heat exchanger function.
53. Explain pulse furnace operation.
54. Explain pulse furnace venting requirements.
55. Identify electric heat components.
56. Calculate electric furnace BTU output.
58. Calculate electric furnace CFM.
59. Draw electric heat schematic.
60. Explain fusible link function.
61. Trace electric heat schematic diagram.
62. Write electric furnace operational sequence.
63. Test electric heat strip.
64. Test electric heat sequencer.

**Student Contributions and Class Policies:**

Each student will spend at least 4 hours per week preparing for class. As a student in this class you are expected to display respect, professional behavior and a cooperative attitude at all times. Punctual attendance is critical in this class. This course will focus on the basic skills needed to perform in the field as a beginning service technician. The student will learn how to use meters and test instruments, how to apply these test instruments to troubleshoot simple electrical problems.

**Evaluation of Students:**

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lab</td>
<td>30%</td>
</tr>
<tr>
<td>Quizzes &amp; Homework</td>
<td>25%</td>
</tr>
<tr>
<td>Attitude &amp; Attendance</td>
<td>20%</td>
</tr>
<tr>
<td>Final Examination</td>
<td>25%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

**Course Schedule:**

The class meets for 6 lecture hours and 6 lab hours per week for 8 weeks.
SCANS Information: The following SCANS skills will be taught and/or reinforced in this course.

SYSTEMS: Suggests modifications to existing systems and develops new or alternative systems to improve performance. Knows how technological systems work and operates effectively with them.

TECHNOLOGY: Chooses procedures, tools or equipment including computers and related technologies. Prevents, identifies, or solves problems with equipment.

Safety Glass Policy: It is required that all persons in the Air Conditioning Program wear eye protection while in the lab. Students are required to furnish their own protection. Visitors will be supplied with a pair of glasses to be used during their visit. If you have any questions about this policy, please ask your instructor to clarify them for you.

Instructor Information: Jaroy Roberts, Instructor
Room 187 TC
(432) 685-4687 Office
(432) 349-5913 cell
E-Mail: jroberts@midland.edu

Office Hours: Posted

Curt Pervier, Applied Technology Dean
Lisa Hays, Applied Technology Secretary
Room 143A TC
(432) 685-4676
Fax: (432)685-6472

Students are encouraged to contact the instructor at any time; however, making an appointment will guarantee the instructor’s availability at a specific time.
Students with Disabilities

Midland College provides services for students with disabilities through Student Services. In order to receive accommodations, students must place documentation on file with the Counselor/Disability Specialist. Students with disabilities should notify Midland College prior to the beginning of each semester. Student Services will provide each student with a letter outlining any reasonable accommodations. The student must present the letter to the instructor at the beginning of the semester.

*Students MUST actively participate by completing an academic assignment required by the instructor by the official census date. Students who do not actively participate in an academically-related activity will be reported as never attended and dropped from course.

Midland College does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities. The following individuals have been designated to handle inquiries regarding the non-discrimination policies: Tana Baker, Title IX Coordinator/Compliance Officer, 3600 N. Garfield, SSC 242, Midland, TX 79705, (432) 685-4781, tbaker@midland.edu; Natasha Morgan, Director Human Resources/Payroll, 3600 N. Garfield, PAD 104, Midland, TX 79705, (432) 685-4534, nmorgan@midland.edu. For further information on notice of non-discrimination, visit http://wdcrobcolp01.ed.gov/CFAPPS/OCR/contactus.cfm or call 1 (800) 421-3481.

Spanish
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