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MIDLAND COLLEGE
SYLLABUS
HART 1345
GAS AND ELECTRIC HEATING
3-3

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. Modern Refrigeration and Air Conditioning **Current edition**
2. 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*
9. Calculate gas furnace *BTU output.*
10. Explain *outside combustion* air requirements.
11. Explain *primary air combustion* requirements.
12. List three *thermostat types*.
13. Explain *multi-stage thermostats.*
14. Explain *cooling anticipator operation*.
15. Explain *heating anticipator operation*.

16. Use *amp meter.*
17. Use *volt meter.*
18. Measure *anticipator current.*
19. Set *heat anticipator*.
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.*
26. Clean *furnace burners*.
27. Explain *electric heat only* thermostat.
28. Explain *two-stage manual changeover* thermostat.
30. Explain *burner orifice sizing*.
31. Explain combustion *air requirements.*
32. Explain gas furnace *safety controls*.
33. Trace gas heat *schematic diagram.*
34. Identify *gas furnace components*.
* 35. Identify *LP gas* pressure requirements.
* 36. Identify *natural gas* pressure requirements.
37. Measure *supply* gas pressure.
* 38. Measure *manifold* gas pressure.
39. Adjust *gas pressure*.
40. Adjust *burner flame.*
41. Analyze *types* of flames.
42. Test *pilot safety*.
43. Test *fan control*.
44. Test *limit safety.*
* 45. Inspect *heat exchanger.*
46. Test *flue draft.*
47. *Troubleshoo*t gas furnace.
48. Perform gas heat *pre-season maintenance.*
49. Read gas heat *schematics*.
50. Install *gas valve.*
51. Install *fan control*.
52. Explain *80+ furnace venting* requirements.

53. Explain *secondary heat exchanger function.*
54. Explain *pulse furnace operation*.
*55. Explain *pulse furnace venting* requirements.
56. Identify electric heat *components.*
57. 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:

Lab	30%
Quizzes & Homework	25%
Attitude & Attendance	20%
Final Examination	25%
Total	100%

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.

Americans with Disabilities Act (ADA) Statement:

Midland College provides services for students with disabilities through Student Services. In order to receive accommodations, students must visit www.midland.edu/accommodation and complete the Application for Accommodation Services located under the Apply for Accommodations tab. Services or accommodations are not automatic, each student must apply and be approved to receive them. All documentation submitted will be reviewed and a "Notice of Accommodations" letter will be sent to instructors outlining any reasonable accommodations.

Midland College Non-Discriminatory Statement:

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Spanish

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