Technical College of the Lowcountry
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ACR 110
HEATING FUNDAMENTALS

Course Description
This course covers the basic concepts of gas and electric heat, their components and operation. Systems will be reviewed as to operation characteristics and environmental efficiencies. Serving, troubleshooting and repair of each system will be covered in the lab.
4 Cr (4 lect/pres, 0 lab, 0 other)

Course Focus
This course will start with theory and then move on to the application stage. The course outline will be chapters 30, 31 and 33.

Text and References
Refrigeration and Air Conditioning Technology 7th. edition, Whitman, Tomczyk, Johnson & Silberstein. Refrigeration and Air Conditioning Technology Lab manual 7th. edition, Whitman, Tomczyk, Johnson & Silberstein.
Publisher: Delmar Cengage Learning, Clifton Park,, NY. Published: 2012
Book ISBN: 1111644470
Lab Manual ISBN: 1111644489

Course Goals
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. explain electric heat
2. explain electrical sequencer
3. change electric heat strip
4. *verify electrical furnace operation
5. demonstrate electrical measurements
6. determine airflow cfm
7. adjust heat anticipator
8. assemble wiring circuits
9. check limit switches
10. determine motor bearing condition
11. interpret wiring circuits
12. demonstrate using motor test equipment
13. measure electrical current
14. test electrical voltage
15. measure heater resistance
16. identify low voltage gas valves

17. identify modulating gas valve
18. identify redundant gas valves
19. recognize two stage gas valve
20. compute system CFM
21. read temperature rise
22. describe standing pilot
23. understand standing pilot thermocouple
24. operate direct spark ignition
25. understand intermittent spark ignition
26. understand glow coil ignition
27. operate gas heat
28. comprehend gas furnace operation
29. take flame sensing current
30. take resistance readings
31. perform safety lockout
32. adjust fan controls
33. define fan/limit controls
34. find safety controls
35. check safety devices
36. measure gas pressure
37. use U-tube manometer
38. adjust gas valve pressure
39. verify gas pressure
40. describe application of gas regulators
41. verify burner flame quality
42. change gas burner
43. change hot surface ignition
44. check electronic pilot
45. test electrical motors
46. test induce draft switches
47. troubleshoot fan motor
48. perform a continuity test
49. *complete conversation of LP to Natural
50. monitor draft motor pressure
51. set heat anticipator
52. disassemble gas furnace
53. use electrical schematics
54. categorize gas limit controls
55. calculate TEL for gas piping
56. calculate gas piping sizes
57. evaluate flue pipe sizes
58. install gas piping
59. calculate flue size
60. explain hydronic heat

Student Contributions

The student is expected to be prepared for class and to be in class on time.
The student is expected to observe and follow all safety rules.
The student will not be allowed in the lab with any type of open toe shoes. (flip flops etc.)
No cell phones are allowed to be used in the classroom or lab. This includes texting.
No recording of classes is allowed.

Course Evaluation
There will be three open book exams worth a maximum of 10 points.
There will be a lab exercise on electric heating worth a maximum of 20 points.
There will be a lab exercise on gas heating worth a maximum of 20 points.
There will be a closed book final exam worth a maximum of 50 points.

Grading:
90 - 100 A
80 - 89 B
70 - 79 C
60 - 69 D
0 - 59 F

Course Schedule
The class meets for 4 lecture/presentation hours per week.

Approved by: _Kenneth Flick_____ _____Developed/Revised: 09-21-2012
Ken Flick, Dean for Business & Industrial Divisions

ADA STATEMENT
The Technical College of the Lowcountry provides access, equal opportunity and reasonable accommodation in its services, programs, activities, education and employment for individuals with disabilities. To request disability accommodation, contact the counselor for students with disabilities at (843) 525-8228 during the first ten business days of the academic term.

ACADEMIC MISCONDUCT
There is no tolerance at TCL for academic dishonesty and misconduct. The College expects all students to conduct themselves with dignity and to maintain high standards of responsible citizenship.

It is the student's responsibility to address any questions regarding what might constitute academic misconduct to the course instructor for further clarification.

The College adheres to the Student Code for the South Carolina Technical College System. Copies of the Student Code and Grievance Procedure are provided in the *TCL Student Handbook*, the Division Office, and the Learning Resources Center.

ATTENDANCE
The College's statement of policy indicates that students must attend ninety percent of total class hours or they will be in violation of the attendance policy.

- Students not physically attending class during the first ten calendar days from the start of the semester must be dropped from the class for NOT ATTENDING.
- Students taking an online/internet class must sign in **and** communicate with the instructor within the first ten calendar days from the start of the semester to indicate attendance in the class. Students not attending class during the first ten calendar days from the start of the semester must be dropped from the class for NOT ATTENDING.
- Reinstatement requires the signature of the division dean.

In the event it becomes necessary for a student to withdraw from the course ***OR*** *if a student stops attending class*, **it is the student's responsibility to initiate and complete the necessary paperwork.** Withdrawing from class may have consequences associated with financial aid and time to completion.

When a student exceeds the allowed absences, the student is in violation of the attendance policy. The instructor MUST withdrawal the student with a grade of "W", "WP", or "WF" depending on the date the student exceeded the allowed absences and the student's progress up to the last date of attendance
or
o under extenuating circumstances and at the discretion of the faculty member teaching the class, allow the student to continue in the class and make-up the work. This exception must be documented at the time the allowed absences are exceeded.
Absences are counted from the first day of class. There are no "excused" absences. All absences are counted, regardless of the reason for the absence.

- A student must take the final exam or be excused from the final exam in order to earn a non-withdrawal grade.

A copy of TCL's STATEMENT **OF POLICY NUMBER:** 3-1-307 CLASS ATTENDANCE (WITHDRAWAL) is on file in the Division Office and in the Learning Resources Center.

HAZARDOUS WEATHER
In case weather conditions are so severe that operation of the College may clearly pose a hardship on students and staff traveling to the College, notification of closing will be made through the following radio and television stations: WYKZ 98.7, WGCO 98.3, WGZO 103.1, WFXH 106.1, WWVV 106.9, WLOW 107.9, WGZR 104.9, WFXH 1130 AM, WLVH 101.1, WSOK 1230 AM, WAEV 97.3, WTOC TV, WTGS TV, WJWJ TV, and WSAV TV. Students, faculty and staff are highly encouraged to opt in to the Emergency Text Message Alert System. www.tcl.edu/textalert.asp

Emergency Text Message Alert

Students, faculty and staff are highly encouraged to opt in to the Emergency Text Message Alert System. Participants receive immediate notification of emergency events and weather cancelations via text messaging on their cell phones. Participants can also opt in to receive non-emergency news and announcements. Go to www.tcl.edu. On the homepage, click on "emergency TextAlert at TCL" and fill out the form or go to www.tcl.edu/textalert.asp