



Technical College of the Lowcountry
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ACR 231 ADVANCED REFRIGERATION

Course Description

This course is an in depth study of commercial and industrial refrigeration equipment.
4 Cr (4 lect/pres, 0 lab, 0 other)

Course Focus

The instructor will instruct advanced theory of operation of evaporators, condensers, compressors and expansion devices.

Text and References

Refrigeration and Air Conditioning Technology 7th. edition, Whitman, Tomczyk, Johnson & Silberstein. Refrigeration and Air Conditioning Technology Lab Manual, 7th. edition, Whitman, Tomczk, Johnson & Silberstein. Publisher: Delmar Cengage Learning, Clifton Park, NY.

Book: Published 2012, ISBN: 1111644470

Lab Manual published: 2012, 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 high temperature refrigeration
2. define low temperature refrigeration
3. address medium temperature refrigeration
4. determine evaporator boiling points
5. identify types of evaporators
6. describe plate/fin evaporator
7. discuss single circuit evaporator

8. discuss multiple circuit evaporator
9. state purpose of condenser
10. comprehend condenser heat exchange
11. compare air cooled condenser
12. compare water cooled condenser
13. describe tube/tube condenser
14. recognize shell/coil condenser
15. recognize shell/tube condenser
16. describe wastewater system
17. describe recirculated water system
18. understand cooling towers
19. understand condensing refrigerant
20. compare condenser efficiency
21. address head pressure valves
22. analyze compressor function
23. calculate compression ratio
24. classify types of compressors
25. disassemble semi-hermetic compressor
26. assemble semi-hermetic compressor
27. disassemble scroll compressor
28. assemble scroll compressor
29. comprehend digital capacity control
30. define compressor slugging
31. analyze scroll compressor protection
32. check compressor efficiency
33. distinguish TXV metering device
34. divide TXV components
35. find external equalizer
36. illustrate needle and seat
37. discuss sensing bulb
38. categorize bulb charge
39. interpret txv function
40. service the txv
41. show solid state txv
42. define automatic txv
43. show capillary tube
44. interpret hot pull down
45. observe hot gas defrost
46. diagnose wet compression
47. explain dry type evaporators
48. check low ambient conditions
49. design head pressure control
50. diagnose bearing washout
51. analyze evaporator pressure drop

52. clean the condenser
53. clean the evaporator
54. explain pid controllers
55. list scroll compressor advantages
56. list digital capacity advantages
57. analyze water cooled condenser
58. backflush water cooled condenser
59. adjust water flow
60. bleed water cooled system

Student Contributions

Each student must complete all reading and written assignments.

In addition, chapter tests are to be completed as assigned.

Students will also complete a final exam/project to demonstrate their knowledge of the material.

The student will not be allowed in the lab with any type of open toe shoe. (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.

The student must have all required books by the second class of the semester. No copies of any books or manuals are allowed.

The student is expected to be in class on time.

Course Evaluation:

There will be open book exam at the end of each chapter. There will be a performance evaluation using the equipment in the lab. There will be a closed book final exam.

Course Schedule

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

Approved by: *Kenneth Flick* Developed/Revised: 1/7/2013
Ken Flick, Division Dean for Business/Industrial Technology

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. Reinstatement requires the signature of the division dean.
- 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

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