



Technical College of the Lowcountry
921 Ribaut Rd.
Beaufort, SC 29901

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ACR 140 AUTOMATIC CONTROLS

Course Description

This course is a study of operation, troubleshooting and repair of a variety of pressure, temperature sensitive and electronic controls used in the HVAC/R industry.
3 Cr (3 lect/pres, 0 lab, 0 other)

Course Focus

The instructor will teach electrical theory and low voltage controls. The student will apply the theory by building a low voltage control board. The student will test and operate the board.

Text and References

1. 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. review safety standards
2. maintain clean work area
3. wear appropriate clothing
4. practice environmental habits
5. describe atom structure
6. describe 24 volt sequencer
7. describe a solenoid
8. describe two pole contactor

9. develop good work habits
10. describe partial liquid
11. discuss the thermocouple
12. state ohms law
13. identify cooling thermostats
14. identify heating thermostats
15. draw electrical symbols
16. draw a transformer
17. draw wiring diagrams
18. interpret wiring diagrams
19. wire series circuit
20. wire parallel circuit
21. define bimetal disc
22. explain good conductors
23. explain the thermistor
24. name low voltage controls
25. calculate electrical watts
26. calculate wire size
27. check alternating current
28. measure A/C voltage
29. clarify correct resistance
30. measure solenoid resistance
31. verify circuit continuity
32. analyze component operation
33. differentiate pictorial diagrams
34. differentiate ladder diagrams
35. identify power consuming devices
36. verify temperature control
37. install programmable thermostats
38. program digital thermostats
39. troubleshoot using electrical meters
40. demonstrate thermostat operation
41. recognize temperature swing
42. quote temperature overshoot
43. adjust heating anticipators
44. develop troubleshooting sequence
45. test GFCI breaker

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 an open book chapter test at the end of each chapter in the course. The students will be made into 3 or 4 person teams. Each team will construct a low voltage control board. Each board will be evaluated as to workmanship and correct operation. There will be a closed book final exam.

Course Schedule

The class meets for 3 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** withdraw 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 WeatherIn 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 Text Alert at TCL" and fill out the form or go to www.tcl.edu/textalert.asp