

# **ELTN 1343 TROUBLESHOOTING**

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## **ELTN 1343 TROUBLESHOOTING**

**Course Description: Maintenance, Operation, Troubleshooting, and repair of circuits of various residential, commercial, and industrial electrical systems.**

**End-of-Course Outcomes: Use multimeters to perform test on electrical equipment, discuss various types of circuits and electrical systems, demonstrate the proper way to test transformers, identify short circuits, identify open and closed circuits, and troubleshoot electric motors, and control circuits.**

## **COURSE MATERIAL:**

*NCCER 2017 Electrical 2 Trainee Guide. Pearson 2014. Contren Learning Series*

Module 26304-17	Hazardous Locations
Module 26302-17	Conductor Selection and Calculations
Module 26305-17	Overcurrent Protection
Module 26409-17	Heat Tracing and Freeze Protection

*Supplemental: 2020 National Electric Code/NFPA 70*

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## **WEEKLY SCHEDULE AND ASSIGNED HOMEWORK**

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WEEK 1	Introductions and Course Description Course Objectives and Goals General Electrical Safety Lecture 1 "Electrical Troubleshooting" Lecture "Hazard Locations" HW: Read "Hazardous Locations" Pages 1-24 HW: Review Questions "Hazardous Locations" Page 25 (1-15)
WEEK 2	Turn in Homework Review for TEST 1 "Hazardous Locations" Lecture "Using Meters to Troubleshoot" Intro to "Conductor Selection and Calculations" Power Point 26304-1 "Hazardous Locations" Power Point 26304-2 "Hazardous Locations" HW: Read "Conductor Selection and Calculations" Pages 1-20 HW: Review Questions "Conductor Selection and Calculations" Page 21 (1-15)
WEEK 3	- TEST 1 "Hazardous Locations" PERFORMANCE TEST 1 "Hazardous Locations" Turn in Homework Troubleshooting using Electrical Schematics Intro to LAB
WEEK 4	Review for TEST 2 "Conductor Selection and Calculations" Voltage Drop Derating Conductors Power Point 26302-1-3 "Conductor Selection and Calculations" Power Point 26302-4-5 "Conductor Selection and Calculations" Lecture "Conductor Selection and Calculations" Lecture "Using Meters to Troubleshoot" LAB
WEEK 5	Review for TEST 2 "Conductor Selection and Calculations" LAB Troubleshooting Lighting Systems

		HW: Read "Heat Trace and Freeze Protection" Pages 1-35
WEEK 6	-	<p>TEST 2 "Conductor Selection and Calculations"</p> <p>PERFORMANCE TEST 2 "Heat Trace and Freeze Protection"</p> <p>LAB</p> <p>Lecture " Heat Trace and Freeze Protection"</p> <p>Power Point 26409-1 "Heat Trace and Freeze Protection"</p> <p>Power Point 26409-2 "Heat Trace and freeze Protection"</p> <p>HW: Review Questions "Heat Trace and Freeze Protection" Pgs. 36 1-15</p>
WEEK 7	-	<p>Lecture Troubleshooting using Schematics and Ladder Diagrams"</p> <p>HW: Read "Over Current Protection" Pages 1-38</p> <p>Review for TEST 3 "Heat Trace and Freeze Protection"</p> <p>Power Point 26409-3 "Heat Trace and Freeze Protection"</p> <p>LAB</p> <p>Troubleshooting Light Fixtures</p>
WEEK 8		<p>TEST 3 "Heat Trace and Freeze Protection"</p> <p>Lecture on "Over Current Protection"</p> <p>Power Point 26305-1 "Over Current Protection"</p> <p>Power Point 26305-2-3 "Over Current Protection"</p> <p>LAB</p> <p>LED Lights and Troubleshooting</p> <p>HW: Review Questions "Over Current Protection" Pg.39 1-20</p>
WEEK 9		<p>Review for TEST 4 "Over Current Protection"</p> <p>LAB</p> <p>Power Point 26305-4-5 "Over Current Protection"</p> <p>Power Point 26305-6-7 "Over Current Protection"</p> <p>Power Point 26305-8-9 "Over Current Protection"</p> <p>Lecture "Developing Troubleshooting Skills"</p> <p>Procedures, Policies, and Safe Work Practices in relation to working on energized lines.</p>
WEEK 10		<p>TEST 4 "Over Current Protection"</p> <p>Lecture " Working with other People"</p> <p>LAB</p> <p>Lecture " Other Troubleshooting tools- the complete picture"</p> <p>Fuses vs. Breakers</p>
WEEK 11		<p>Lecture " Troubleshooting Techniques"</p> <p>LAB</p>

Using Meters to Minimize Downtime  
Lecture " Understanding Automation"

WEEK 12	Lecture "Aides to Troubleshooting" LAB Preventative Maintenance Resistance Testing Lecture: " All circuits will eventually fail- make sure they fail correctly "
WEEK 13	Lecture " Preventative Maintenance" LAB Review Grades/Instructor Critique
WEEK 14	Review for Final Complete Lab Book Lecture "Solving Electrical Problems" Lecture "Advanced Electrical Troubleshooting"
WEEK 15	Turn in Modules, Lab Book, and all Home work FINAL <b>Course Evaluation</b>

## Course Evaluation and Grades:

### POINTS

TEST 1	10
TEST 2	10
TEST 3	10
TEST 4	10
RQ 1	2
RQ 2	2
RQ 3	2
RQ 4	2
FINAL	15
LAB 1	3
LAB 2	3
LAB 3	3
LAB 4	3
LAB 5	3
LAB BOOK	15
PERFORMANCE 1	3
PERFORMANCE 2	4

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**POINTS POSSIBLE:      100**

15%      LAB 1-5  
8%      REVIEW QUESTIONS/SUPPLEMENTAL  
40%      MODULE EXAMS  
15%      FINAL EXAM  
7%      PERFORMANCE TEST  
15%      LAB BOOK

100-90 POINTS      = A

89-80 POINTS      = B

79-70 POINTS      =C

69-60 POINTS      =D

59 POINTS OR LOWER IS FAILING

## **PERFORMANCE TEST**

**26304-**

### **HAZARDOUS LOCATIONS**

Install and pour a conduit seal utilizing fiber and sealing compound

**26302-**

### **CONDUCTOR SELECTION AND CALCULATIONS**

This is a knowledge based module. There are no Performance Test.

**26305-**

### **OVERCURRENT PROTECTION**

This is a knowledge based module. There are no Performance Test.

**26409-**

### **HEAT TRACE AND FREEZE PROTECTION**

Prepare and connect heat tracing cable in a power connection box or splice box

### **USING EQUIPMENT TO ASSIST IN TROUBLESHOOTING**

**Multimeters**

**Light Meters**

**Volt Alert**

**Resistance Tester**

**Fox and Hound**

## **NCCER Retesting Procedures for Brazosport College**

**Class Grade:** first score on an NCCER Module Quiz counts as College grade for that module.

**NCCER Passing Score:** A module score of 70 or higher.

**Retest Eligibility:** A score below 70 on a module exam will require a 48 hour wait period for retesting the same title.

**Performance Profile Testing:** Hands on demonstrations of specific competencies as required by NCCER for a particular module.

All Performance testing for NCCER certification purposes will be Pass / Fail.

### **Testing Policy:**

1. All NCCER retakes and Performance Profile Tasks must be taken before the Brazosport College Final Exam.
2. A score below 70 on a module exam may retest within 48 hours on the same title.  
A score below 60 on a module exam will require a 48 hour wait period for retesting the same title. Re-testing can only occur 48 hours after the first test; this is the 2<sup>nd</sup> attempt.
3. No third attempts at retaking an NCCER Module exam.

The number and frequency of requests for retesting for NCCER certifications at Brazosport College has been rising. Because of the number of requests and the restrictions that are in place due to NCCER statute of limitations, it is recommended that a testing procedure be in place to ensure a fair and equitable testing policy.

### **Criterion 1: Statute of Limitations of 3 years.**

Upon request of a student for NCCER retesting, the initial criterion will be the date of the class was taken. If the class was taken longer than 3 years prior, the statute of limitations is in effect and no retests can be given at Brazosport College

### **Criterion 2: Course Completion.**

Did the student drop or withdraw from the course? Students that have dropped or withdrawn from the course will not be given the opportunity for retesting any NCCER module tests for the course at Brazosport College.

### **Criterion 3: Success in the Course.**

Did the student pass the course? Mastery of course content is paramount in assessing and managing safe work environments. If the student did not pass the Brazosport College course for college credit, no retesting will be permitted.

**Criterion 4: Incompletions not addressed within 60 days.**

If a student received an "incomplete" for the course, all coursework including retesting must be completed by 60 days from the last date of the semester.

**Criterion 5: Quantity of Tests.**

Students that have more than 25% of module tests, performance profiles, or combination exceeding 25% performance and assessment tests will not be given the opportunity to retest.

For SHEM students: review of NCCER Module Content is a benefit that is offered to students that wish to schedule a review time with a full time OSHT instructor. Students attending the review should allocate a minimum of 1 ½ hours to allow for review and testing time. The student must bring their book to facilitate the review. If the student has no book, they may gain special permission from an instructor to present to the library to use a NCCER reference book.

**Criterion 7: Holds on Student Account.**

The business office, library and/or other departments of the college should have no holds on student account for outstanding fines, fees or financial holds, otherwise re-testing will not be granted.

**Testing Procedures.**

NCCER Module Testing:

- All NCCER testing must be administered by NCCER approved testers.
- Approved facilitators are:
  - Fanny Frausto, AOS of the Office of Workforce Development & School Partnerships
  - Learning Services, NCCER Certified Testing Proctors
  - Full time Instructors of the Brazosport College Safety Program
- SHEM students will be limited to 1 ½ hours for NCCER module review and testing, including Performance Profile Testing.

NCCER Performance Profiles:

- Students will be limited to 30 minutes for NCCER Performance Profile testing.
  - Performance Profiles will be administered by Full Time Instructors of Brazosport College
- NCCER Module Test + Performance Profiles:
  - Students needing to retest for an NCCER Module Test and Performance Profile from the same unit will be limited to 1 ½ hours for the review and assessment.
  - Module + Performance Profiles will only be administered by a Full Time Instructor of Brazosport College.

*Implementation: This procedure will be initiated upon a request from the student on retesting. The request may be made to any program faculty, adjunct or full time, or the NCCER Site Representative. All requests, regardless of the origination shall be forwarded to the NCCER Site Representative for review. At that time, the student will complete the request formally on the NCCER Retesting Request Form. After the review, the completed form and decision regarding the availability for retesting will be made via verbally or in email to the following: the student; the faculty program coordinator; and the Director of Workforce Development.*



## **STUDENTS WITH DISABILITIES**

BC is committed to providing equal education opportunities to every student. BC offers services for individuals with special needs and capabilities including counseling, tutoring, equipment, and software to assist students with special needs. Please contact Phil Robertson, Special Populations Counselor at 979-230-3236 for further information.

## **ACADEMIC HONESTY**

Brazosport College assumes that students eligible to perform on the college level are familiar with the ordinary rules governing proper conduct including academic honesty. The principle of academic honesty is that all work presented by you is yours alone. Academic dishonesty including, but not limited to, cheating, plagiarism, and collusion shall be treated appropriately. Please refer to the Brazosport College Student Guide for more information. This is available online at <http://www.brazosport.edu>.

Academic dishonesty violates both the policies of this course and the Student Code of Conduct. In this class, any occurrence of academic dishonesty will be referred to the Dean of Student Services for prompt adjudication, and may, at a minimum, result in a full 10 point grade reduction from this course. Sanctions may be imposed beyond your grade in this course by the Dean of Student Services.

## **ATTENDANCE AND WITHDRAWAL POLICY**

During each class period we will be learning basic skills/knowledge of the construction industry. If you miss a class, it is your responsibility to schedule any make-up test, homework, or in class assignment with the instructor.

If you fall behind in this class it is your responsibility to withdraw from the class. Because you stop attending class, it does not mean that you have officially withdrawn from class. To officially withdraw and receive a "W" in this class, you need to complete a withdrawal form before the official deadline which is available on the Brazosport College Website.

The Instructor may withdrawal you from this course if you miss in excess of 3 class times, unexcused.

During class, cell phones and pagers are to be turned off or set in "vibrate" mode for the entire class period. Texting is not allowed in this class. If you are expecting a call or text of an emergent nature, please inform me before class to make arrangements in handling the call.

## **ASSIGNMENTS AND MAKE-UP POLICY**

Students are responsible for completing all reading and homework assignments prior to class. There will be a test and a performance lab for each module. In order to receive NCCER credit for

the module, you must pass the written test with a minimum score of 70. You have two attempts to achieve a score of 70; however you must have waited 48 hours before repeating the test. Your highest score will be used for the course grade.

### **COMPUTER USAGE**

Computers are to be used for class assignments only. If you are using classroom computers for personal use during class, you will be asked to leave immediately. You will be counted absent and receive a zero for any work assigned during the class period. This includes homework as well as in-class assignments.

Required course materials are available at the Brazosport College bookstore, on campus or online at <http://www.brazosport.edu/bookstore>. A student of this institution is not under any obligation to purchase a textbook from the college bookstore. The same textbook is/may also be available from an independent retailer, including an online retail store.

### **Title IX Statement :**

Brazosport College faculty and staff are committed to supporting students and upholding the College District's non-discrimination policy. Under Title IX and Brazosport College's policy FFDA (Local), discrimination based on sex, gender, sexual orientation, gender identity, and gender expression is prohibited. If you experience an incident of discrimination, we encourage you to report it. While you may talk to a faculty or staff member at BC, please understand that they are "Responsible Employees" and must report what you tell them to college officials. You can also contact the Title IX Coordinators directly by using the contact information below. Additional information is found on the Sexual Misconduct webpage at [www.brazosport.edu/sexualmisconduct](http://www.brazosport.edu/sexualmisconduct).

Kelli Forde Spiers, Director, Student Life and Title IX Coordinator  
Office J-117D; 979-230-3355; [kelli.fordespiers@brazosport.edu](mailto:kelli.fordespiers@brazosport.edu)

Victoria Young, HR Coordinator and Deputy Title IX Coordinator  
Office C-114; 979-230-3303; [victoria.young@brazosport.edu](mailto:victoria.young@brazosport.edu)

### **COVID-19 AND HYBRID CLASSES (See Attachment "Addendum A")**

## **ELTN 1343 "Electrical Troubleshooting" Classroom Rules Sign Off Sheet**

I, \_\_\_\_\_ have received a copy of the Syllabus for the "ELTN 1343 ELECTRICAL TROUBLESHOOTING " Course. I am aware of my responsibilities to follow and adhere to the rules and requirements written within.

\_\_\_\_\_  
Name (Student):

\_\_\_\_\_  
Date:







