# 11/6/2020

# brcc keystone logo

Baton Rouge Community College

*Academic Affairs Master Syllabus*

Date Approved: 3 September 2020

Term and Year of Implementation: Spring 2021

**Course Title:** Electrical Level 4

**BRCC Course Rubric:** ELEC 1419

**Previous Course Rubric**:

**Lecture Hours per week-Lab Hours per week-Credit Hours**: 3-12-9

**Per semester: Lecture Hours-Lab Hours-Instructional Contact Hours**: 45-180-225

**Louisiana Common Course Number:**

**CIP Code:** 46.0302

**Course Description:** Covers the National Center for Construction Education and Research (NCCER) Electrical Level 4 Modules 1 - 13: Load Calculations - Feeders and Services, Health Care Facilities, Standby and Emergency Systems, Basic Electronic Theory, Fire Alarm Systems, Specialty Transformers, and Advanced Controls, HVAC (Heating, Ventilation, and Air Conditioning) Controls, Heat Tracing and Freeze Protection, Motor Operation and Maintenance, Medium-Voltage Terminations/Splices, Special Locations, and Fundamentals of Crew Leadership. Successful completion of this course requires passing the NCCER Level 4 Electrical Modules 1 – 13 Exams with a 70% or higher.

**Prerequisites:**  ELEC 1326

**Co-requisites:** None

**Suggested Enrollment Cap:** 15

**Learning Outcomes.** *Upon successful completion of this course, the students will be able to:*

1. Describe the electrical characteristics and basic materials that make up solid-state devices, the various types of transistors and diodes, the characteristics and functions of various fire alarm system components, the different types of circuitry that connect fire alarm systems, and the operating principles of different types of motor controllers and motor brakes.

2. Install overcurrent protection for specialty transformers, non-programmable and programmable motor circuit protectors, and electromechanical and solid-state timing relays for specific applications in motor control circuits.

3. Install selected thermostats, electric heat tracing equipment, de-icing systems, snow-melting and anti-icing systems, electric heat traced domestic hot-water systems, and electric floor heating systems.

4. Describe the factors related to motor reliability and life span and the devices and wiring methods for special occupancies.

5. Complete cable assemblies using terminations and splices.

**Assessment Measures.** Assessment of all learning outcomes will be measured using the following methods:

1. Practical demonstrations and skills performances

2. Homework assignments, quizzes, and tests

3. NCCER Electrical Level 4 Modules 1 - 13 Exams

**Information to be included on the Instructor’s Course Syllabi:**

* ***Disability Statement*:** Baton Rouge Community College seeks to meet the needs of its students in many ways. See the Office of Disability Services to receive suggestions for disability statements that should be included in each syllabus.
* ***Grading:*** The College grading policy should be included in the course syllabus. Any special practices should also go here. This should include the instructor’s and/or the department’s policy for make-up work. For example in a speech course, “Speeches not given on due date will receive no grade higher than a sixty” or “Make-up work will not be accepted after the last day of class”.
* ***Attendance Policy*:** Include the overall attendance policy of the college. Instructors may want to add additional information in individual syllabi to meet the needs of their courses.
* ***General Policies*:** Instructors’ policy on the use of things such as beepers and cell phones and/or hand held programmable calculators should be covered in this section.
* ***Cheating and Plagiarism*:** This must be included in all syllabi and should include the penalties for incidents in a given class. Students should have a clear idea of what constitutes cheating in a given course.
* ***Safety Concerns:*** In some courses, this may be a major issue. For example, “No student will be allowed in the lab without safety glasses”. General statements such as, “Items that may be harmful to one’s self or others should not be brought to class”.
* ***Library/ Learning Resources:*** Since the development of the total person is part of our mission, assignments in the library and/or the Learning Resources Center should be included to assist students in enhancing skills and in using resources. Students should be encouraged to use the library for reading enjoyment as part of lifelong learning.

**Expanded Course Outline:**

I. Load Calculations - Feeders and Services

A. Basic Calculation Procedures

B. Load Calculations for a Minimum Size Service

C. Commercial Occupancy Calculations

D. Restaurants and Optional Calculation for New Restaurants

E. Hotels and Motels

F. Optional Calculations for Schools

G. Shore Power Circuits for Marinas and Boatyards

H. Farm Load Calculations

I. Motors and Motor Circuits

II. Health Care Facilities

A. Essential Electrical System Types

B. Electrical Distribution Systems

C. Wiring and Devices

D. Communication

E. Signaling, Data, and Fire Alarm Systems

F. Isolated Power Systems

III. Standby and Emergency Systems

A. Emergency and Standby Power System Components

B. Storage Batteries

C. Static Uninterruptible Power Supply

D. National Electrical Code (NEC) Requirements for Emergency Systems

E. Emergency System Circuits for Light and Power

IV. Basic Electronic Theory

A. Electricity Under Magnification

B. Semiconductor Fundamentals

C. Diodes

D. Light-Emitting Diodes

E. Transistors

F. Silicon-Controlled Rectifiers

G. Diacs and Triacs

V. Fire Alarm Systems

A. Codes and Standards

B. Fire Alarm Systems Overview

C. Fire Alarm System Equipment

D. Fire Alarm Initiating Devices

E. Control Panels

F. Fire Alarm Control Panel (FACP) Primary and Secondary Power

G. Notification Appliances

H. Communications and Monitoring

I. General Installation Guidelines

J. Total Premises Fire Alarm System Installation Guidelines

K. Fire Alarm Related Systems and Installation Guidelines

L. Troubleshooting

VI. Specialty Transformers

A. Specialty Transformers

B. Instrument Transformers

C. Sizing Buck-and-Boost Transformers

D. Harmonics

VII. Advanced Controls

A. Solid-State Relays

B. Solid-State Protective Relays

C. Timing Relays

D. Reduced-Voltage Starting Motor Control

E. Adjustable Frequency Drives

F. Motor Braking Methods

G. Precautions When Working with Solid-State Controls

H. Motor Control Maintenance

I. Motor Control Troubleshooting

VIII. Heating, Ventilation, and Air Conditioning (HVAC) Controls

A. Heating

B. Ventilation

C. Air Conditioning

D. Thermostats

E. HVAC Control Systems

F. HVAC Digital Control Systems

G. Control Circuit Review

H. National Electrical Code (NEC) Requirements

I. Troubleshooting

IX. Heat Tracing and Freeze Protection

A. Pipeline Heat Tracing Applications

B. Pipeline Electric Heat Tracing Systems

C. Roof, Gutter, and Downspout De-Icing Systems

D. Snow-Melting and Anti-Icing Systems

E. Domestic Hot-Water Temperature Maintenance Systems

F. Floor Heating and Warming Systems

X. Motor Operation and Maintenance

A. Squirrel Cage Motors

B. Motor Maintenance

C. Motor Bearing Maintenance

D. Motor Insulation Testing

E. Receiving and Storing Motors

F. Troubleshooting Motors

G. Motor Installation and Commissioning Guidelines

XI. Medium-Voltage Terminations/Splices

A. Medium-Voltage Power Cable

B. Splicing

C. Terminations

D. High-Potential (Hi-Pot) Testing

XII. Special Locations

A. Assembly Occupancies

B. Theaters and Similar Locations

C. Carnivals, Circuses, Fairs, and Similar Events

D. Agricultural Buildings

E. Marinas and Boatyards

F. Temporary Installations

G. Wired Partitions

H. Swimming Pools, Fountains, Hot Tubs, and Similar Installations

I. Natural and Manmade Bodies of Water

XIII. Fundamentals of Crew Leadership

A. The Basics

B. Leadership Skills

C. Safety

D. Project Control