**BARTON COMMUNITY COLLEGE**

**COURSE SYLLABUS**

1. **GENERAL COURSE INFORMATION**

Course Number: NATG 1125

Course Title: Electrical Devices and Controls I

Credit Hours: 3

Prerequisites: NATG 1100 DC Circuit Fundamentals, and NATG 1105 AC Circuit Fundamentals.

Division/Discipline: Workforce Training and Community Education/Natural Gas Transmission and Distribution Technician.

Course Description: This course teaches students to identify basic electrical/electronic symbols in a schematic diagram, design a simple motor service in compliance with National Electrical Code mandates and recommendations, calculate voltage drop in a single or three phase AC service, and be familiar with the design, operation, and safety considerations of electrical components such as fuses, circuit breakers, overloads, conductors, conduits, contactors, and relays. Students will also learn to build and safely troubleshoot several electro-mechanical relay circuits.

# **INSTRUCTOR INFORMATION**

# **COLLEGE POLICIES**

Students and faculty of Barton Community College constitute a special community engaged in the process of education. The College assumes that its students and faculty will demonstrate a code of personal honor that is based upon courtesy, integrity, common sense, and respect for others both within and outside the classroom.

Plagiarism on any academic endeavors at Barton Community College will not be tolerated. The student is responsible for learning the rules of, and avoiding instances of, intentional or unintentional plagiarism. Information about academic integrity is located in the Student Handbook.

The College reserves the right to suspend a student for conduct that is determined to be detrimental to the College educational endeavors as outlined in the College Catalog, Student Handbook, and College Policy & Procedure Manual. (Most up-to-date documents are available on the College webpage.)

Any student seeking an accommodation under the provisions of the Americans with Disability Act (ADA) is to notify Student Support Services via email at [disabilityservices@bartonccc.edu](mailto:disabilityservices@bartonccc.edu)

# **COURSE AS VIEWED IN THE TOTAL CURRICULUM**

This course introduces the student to control circuits and provides the training to utilize safe troubleshooting techniques. An understanding of control circuits is integral to the technician’s complete skill set required in the natural gas industry.

# **ASSESSMENT OF STUDENT LEARNING**

Barton Community College is committed to the assessment of student learning and to quality education. Assessment activities provide a means to develop an understanding of how students learn, what they know, and what they can do with their knowledge. Results from these various activities guide Barton, as a learning college, in finding ways to improve student learning.

1. Identify electrical/electronic symbols in a schematic diagram.
   1. Identify electrical symbols in a schematic diagram.
   2. Identify electronic symbols in a schematic diagram.
   3. Analyze the interconnection of electrical/electronic symbols on a schematic diagram to determine how the circuit operates.
   4. Utilize schematic diagrams to build and troubleshoot relay control circuits.
2. Apply National Electrical Code mandates and recommendations.
3. Size motor starters to comply with NEMA standards.
4. Identify full-load amperage of a motor.
5. Analyze fuses and circuit breakers for optimal over-current protection.
6. Use tables and formulae to find over-current and overload protection values.
7. Use tables to find allowable conductor ampacities.
8. Use tables to find allowable conduit sizes.
9. Use tables and formulae to design optimal grounding systems.
10. Calculate the voltage drop in single or three phase AC electrical services.
11. Use single-phase formula.
12. Use three-phase formula.
13. Demonstrate the proper use of meters.
14. Define the characteristics and safe usage of voltmeters.
15. Define the characteristics and safe usage of ammeters.
16. Define the characteristics and safe usage of ohmmeters.
17. Define the characteristics of electromechanical relays.
18. Analyze the individual components of contactors.
19. Explain the advantages of machine-tool relays.
20. Explain the various applications for open-face relays.
21. Differentiate between momentary, latch, and time delay cube relays.
22. Define the various “forms” used to describe relay contact arrangements
23. Define the characteristics of solid-state relays.
24. Compare to electromechanical relays.
25. Define input and output circuits.
26. List and explain the four types of switching.
27. Define the various kinds of hand-operated mechanical switches.
    1. Explain the applications for toggle, rocker-arm, rotary, dip, push-button, wafer, illuminated, and selector switches.
28. Apply circuit troubleshooting skills.
29. Use a voltmeter to analyze and troubleshoot circuit problems.
30. Trace through schematics to identify problems.

1. **INSTRUCTOR'S EXPECTATIONS OF STUDENTS IN CLASS**

# **TEXTBOOKS AND OTHER REQUIRED MATERIALS**

# **REFERENCES**

# **METHODS OF INSTRUCTION AND EVALUATION**

# **ATTENDANCE REQUIREMENTS**

# **COURSE OUTLINE**