ELEC A102: SAFETY, MAINTENANCE, AND CALIBRATION

Item	Value
Curriculum Committee Approval Date	10/30/2024
Top Code	093400 - Electronics and Electric Technology
Units	1 Total Units
Hours	36 Total Hours (Lecture Hours 9; Lab Hours 27)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S)

Course Description

Students will learn the fundamentals to safely work with high energy systems in accordance with NFPA 70e standards. This course explores the safety standards adopted and established by the NFPA and OSHA. Students will acquire hands-on experience using multimeters and oscilloscopes to safely diagnose electrical problems. This course covers the foundational concepts of calibration in electronic test equipment. Formerly known as ELEC A170. Transfer Credit: CSU.

Course Level Student Learning Outcome(s)

1. Students will be able to identify risks and demonstrate safe working practices in an industrial environment.
2. Students will be able to select and use appropriate tools and diagnostic equipment to perform maintenance tasks on electronic equipment.
3. Students will gain proficiency in the maintenance of electrical, electronic, and instrumentation systems.
4. Students will be able to use industry standard documentation procedures to draft schematics and wiring diagrams.

Course Objectives

- 1. Practice safe working habits and follow safety procedures
- 2. Use industry standard test equipment to test, diagnose and calibrate electrical, electronic, electro-mechanical, instrumentation, robotic, and automation systems.
- 3. Understand the risks associated with working on or near electrical components.
- 4. Understand the risk Electrostatic Discharge (ESD) poses to equipment.
- 5. Demonstrate proper selection and use of a fire extinguisher.
- 6. Demonstrate proper technique for stripping wires and using screw terminals.
- 7. Demonstrate proficiency drafting schematics and wiring diagrams.

Lecture Content

Safety NFPA 70E Arc Flash Risks Electrocution Risks General Safety Precautions Laboratory safety procedures Electrostatic discharge (ESD) Fire Extinguishers Classifications Applications Proper Use and Procedure Maintenance Preventative Maintenance of Electronics Wiring Techniques Diagnostic Fundamentals Voltage Current Clamps Motor Resistance Measurement Calibration Accuracy vs Precision Calibration Standards Organizations and Services

Lab Content

Tools Equipment Identification Calibration Proficiency Oscilloscopes Multimeters Benchtop Power Supplies Signal Generators Maintenance Skills Risk Analysis Diagnostic Practical Skills Wiring Skills Stripping Labeling Management Safety Risk Analysis Demonstrate properly entering various enclosures. Demonstrate techniques for working safely in various enclosures.

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Lecture Detailed whiteboard lectures with opportunity for student engagement. Discussion of media provided and assigned via LMS. Demonstration of technical skills. Lab Students build, test, and calibrate electronic circuits. Lab projects reinforce lecture topics and are paced to coincide or lag the lecture content. Lab projects generate content that students use to draft schematics and wiring diagrams.

Reading Assignments

Student will read the instructor provided handouts available via LMS. Approximately 1 hour a week

Writing Assignments

The out of class drafting assignment will require writing. Students will spend approximately 30 minutes a week writing as a matter of drafting the following- Circuit Schematics Wiring Diagrams

Out-of-class Assignments

Students will spend approximately 1 hour a week drafting the following- Circuit Schematics Wiring Diagrams

Demonstration of Critical Thinking

Students will build, test, and calibrate several electronic circuits. Students will utilize test equipment to evaluate performance of electronic circuits. Students use their knowledge of NFPA 70E to evaluate risks associated with working on several systems.

Required Writing, Problem Solving, Skills Demonstration

The students are required to keep a portfolio of lab projects. Students will demonstrate the skills required to maintain, test, and calibrate electronic circuits. Each lab project requires a technical report consisting of the following Circuit Schematic Wiring Diagram

Eligible Disciplines

Electricity (electrical power distribution): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Electromechanical technology (industrial mechanical technology): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Electronic technology (radio, television, computer repair, avionics): Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Electronics: Any bachelor's degree and two years of professional experience, or any associate degree and six years of professional experience. Engineering: Master's degree in any field of engineering OR bachelor's degree in any of the above AND master's degree in mathematics, physics, computer science, chemistry, or geology OR the equivalent. (NOTE: A bachelor's degree in any field of engineering with a professional engineer's license is an alternative qualification for this discipline.) Master's degree required. Title 5, section 53410.1 Engineering technology: Master's degree in any field of engineering technology or engineering OR bachelor's degree in either of the above AND master's degree in physics, mathematics, computer science, biological science, or chemistry, OR bachelor's degree in industrial technology, engineering technology or engineering AND a professional engineer's license OR the equivalent. Master's degree required.

Textbooks Resources

1. Required Tomal, D. Agahanian, A. . Electronic Troubleshooting, 4th ed. McGraw-Hill Education, 2014

Other Resources

1. Material provided via LMS.