

**CUYAHOGA COMMUNITY COLLEGE  
OFFICIAL COURSE OUTLINE**

**SUBJECT AREA TITLE**

Applied Industrial Technology – Electrical Construction

**COURSE TITLE**

Electrical Instrumentation

**SUBJECT AREA CODE:** ATEL

**COURSE NUMBER:** 2700

**COURSE CREDIT HOURS:** 4

**I. DESCRIPTION OF COURSE:**

**CATALOG DESCRIPTION**

Introduction into various types of instruments employed in industry, along with operating principles and actual application. Instruments covered are those used in measurement, transmission, and control of various industrial processes.

**LECTURE HOURS:** 4

**LAB HOURS:** None

**OTHER REQUIRED HOURS:** 00

**PREREQUISITE(S):**

**II. OUTCOMES/OBJECTIVES**

Upon satisfactory completion of Electrical Instrumentation, the student should be able to perform the following outcomes/supporting objectives:

- A. Use millimeters, oscilloscopes, and high voltage testers to locate cable faults, complete earth testing, and calibrate.
  - 1. Demonstrate the use of multimeters and oscilloscopes.
  - 2. Operate high voltage testers and locate cable faults.
  - 3. Discuss principles and methods of earth testing.
  - 4. Discuss calibration, floor, pressure temperature, and pneumatics.
  - 5. Demonstrate instrument calibration.
  - 6. Identify instrument symbols.

**III. COURSE CONTENT:**

A. Concepts

- 1. Instrumentation definitions
- 2. Instrumentation fundamentals
- 3. Instrument symbols

4. Electrical test instruments
5. Using oscilloscopes
6. Oscilloscope signals
7. Oscilloscope operation techniques
8. Principles and methods of earth testing
9. Fundamentals of instrument calibration
10. Instrument calibration procedures
11. Instrument calibration procedures
12. Fundamentals of flow
13. Fundamentals of pressure
14. Fundamentals of level
15. Fundamentals of temperature
16. Fundamentals of control valves
17. Fundamentals of pneumatics
18. Fundamentals of controllers
19. Insulation quality testing techniques
20. High voltage testing preparation techniques
21. Megohmmeter operation techniques
22. Terminal methods
23. Tracing methods
24. Magnetic methods
25. Multimeter operation techniques
26. Grounding equipment operation techniques
27. Safety procedures for high voltage testing

**B. Skills**

1. Using multimeters
2. Using oscilloscopes to measure voltage and frequency
3. Analyzing and interpreting oscilloscope signals
4. Using the equipment grounding conductor for proper grounding
5. Preparing for high voltage testing
6. Completing insulation quality testing
7. Accepting and maintaining testing
8. Testing insulation using a megohmmeter
9. Locating cable faults using terminal, tracing, and magnetic methods

**IV. METHODS OF STUDENT EVALUATION MAY INCLUDE ANY OF THE FOLLOWING:**

- A. Quizzes
- B. Exams
- C. Classroom participation

D. Completion of assigned projects

**V. RESOURCES MAY INCLUDE ANY OF THE FOLLOWING:**

A. I.A.E.I. Soares Book on Grounding. 8<sup>th</sup> ed. N.p.: International Association of Electrical Inspectors, 2001.

B. National Joint Apprenticeship and Training Committee. Grounding Workbook. Richardson: National Joint Apprenticeship and Training Committee, 2005.

C. National Electrical Code Committee. National Electrical Code. 2005 ed. Quincy: National Fire Protection Association, Inc., 2004.

D. National Joint Apprenticeship and Training Committee. Test Instruments. N.p.: American Technical Publishers, 2005.

E. National Joint Apprenticeship and Training Committee. Fundamentals of Instrumentation. N.p.: Thomson-Delmar, 2005.