

COCONINO COMMUNITY COLLEGE
COURSE OUTLINE

Revised by: Ken Myers
Effective Term: Fall 2020

December 17, 2017

A. Identification:

1. Subject Area: Construction Technology Management (CTM)
2. Course Number: 150
3. Course Title: Basic Electrical Theory
4. Credit Hours: 3
5. Course Description: Introduction to both alternating current (A.C.) and direct current (D.C.) of electrical theory, along with the fundamentals of algebra and trigonometry used to compute circuit analysis. Electrical safety and first aid, introduction to direct current theory and battery sources, A.C. theory, alternating current circuits including resistive, inductive, and capacitive circuits that are in series, parallel and combination configuration. Additional topics include: Ohm's Law, phase and vector analysis, electrical and electronic diagrams and schematics, wire gauges, ampacity for line and loads, as well as grounding and bonding of circuits. This class will emphasize the proper use and function of electrical multi-meters. Prerequisite: MAT 097 or placement into MAT 187. Three lecture. May be taken for S/U credit.

- B. Course Goals: Introduce the student to both A.C and D.C. theory and the fundamentals of electrical circuits including Ohm's Law as it applies to the methods, procedures, applications used in electrical theory, electrical safety, bonding and grounding. Gain the ability to read and interpret electrical drawings, blueprints, and schematic and use electrical test equipment to diagnose electrical issues and malfunctions, symbols and schematic drawings, proper circuit layouts used in electrical testing and electrical blueprint reading.

C. Course Outcomes

Upon successful completion of this course, students will be able to:

1. demonstrate the proper use of a variety of electrical hand and power tools;
2. identify the differences in the electrical trades and study its history;
3. identify electrical inventors;
4. explain the concepts of electromagnetism;
5. explain the fundamentals of electricity;
6. review fundamental electrical terminology;
7. calculate Ohm's Law using basic algebra, trigonometry, and vector analysis;
8. identify specific electrical and electronic symbols, circuits, diagrams and devices;
9. understand the dynamics of series, parallel, and combination circuit analysis;
10. compute calculations for electrical and electronic circuits;
11. determine proper circuit layout and solve series, parallel and combination circuits problems;
12. explain the purpose of various types of switches;
13. understand electrical shock and recognize shock hazards;
14. demonstrate cardiopulmonary resuscitation (CPR), choking respiratory techniques;
15. explore types and methods of bonding and grounding;
16. identify specific types of wire and wire sizes; calculate wire size for ampacity;
17. identify electrical overload hazards and over current protection;
18. demonstrate proper use of electrical meters and test equipment;
19. identify hazardous materials and interpret safety data and sheets (SDS);
20. explore federal, state, and local jurisdictions that govern electrical work;

D. Course Outcomes Assessment:

Must include:

quizzes, tests, and hands-on demonstrations to meet industry standards.

E. Course Content will include:

1. hand and power tools for electricians;
2. electrical history and inventions;
3. electrical inventors;
4. fundamentals of magnetism;
5. electrical fundamentals;
6. fundamental electrical terms, signs and symbols;
7. Ohm's Law and calculations;
8. read electrical circuit diagrams;
9. series and parallel circuits;
10. series and parallel calculations;
11. electrical circuit calculations;
12. wire types, calculate wire size, calculate power and roots;
13. electrical shock hazard identification;
14. CPR choking and respiratory;
15. bonding and grounding theory and circuits and calculations;
16. current carrying capacity of wire sizes;
17. circuit wiring and loading;
18. electrical measuring devices, tools and meters;
19. hazardous materials, material safety data sheets;
20. governing entities and electrical fundamentals: National Electrical Code (NEC), American National Standards (ANSI), Underwriters Laboratories (UL), National Electrical Manufacturers Association (NEMA).