

APEL 121A: ELECTRON THEORY; AC & DC ELECTRICAL THEORY; NEC INTRODUCTION; PARALLEL & COMBINATION CIRCUITS

Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2023
Units:	5
Hours:	36 lecture, 84 laboratory per quarter (120 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
Advisory:	Not open to students with credit in APRT 121.
Degree & Credit Status:	Degree-Applicable Credit Course
Foothill GE:	Non-GE
Transferable:	None
Grade Type:	Letter Grade (Request for Pass/No Pass)
Repeatability:	Not Repeatable

Student Learning Outcomes

- To understand the layout of the code book and why there is one
- To understand the basic DC electrical theory

Description

Introduction to the National Electrical Code (NEC), applied codeology toward the National Electrical Code. Discuss and demonstrate basic AC and DC electrical generation. Ohm's Law, understand DC parallel and combination circuits. Basic three-phase AC.

Course Objectives

The student will be able to:

- Understand the National Electrical Code
- Understand the use of applied codeology towards the National Electrical Code
- Understand, discuss, and demonstrate basic AC and DC electrical generation
- Understand Ohm's Law
- Understand DC parallel and combination circuits
- Understand basic three-phase AC

Course Content

- National Electrical Code (NEC)
 - Purpose and intent of electrical codes
 - Scope on NEC and local codes

- Applied codeology
 - How local codes may differ from other local codes
 - Recognize and apply dimensions
- Basic AC and DC electrical generation
 - Parts of a AC and DC generator
 - Calculations of AC resistive circuits
- Ohm's Law
 - Total resistance using product-sum and reciprocal methods
 - Alternate current paths
 - Currents
 - Law of proportion
 - Power requirements of components
- DC parallel and combination circuits
 - Components
 - Differences between series and parallel circuits
- Basic three-phase AC
 - Wye and Delta windings
 - Three phase sine wave
 - Operation and characteristics of three phase systems

Lab Content

Students will work individually and in teams on proper wiring and grounding of electrical systems. Safe working practices are reviewed and will include:

- Equipment safety
- Fire protection
- Electrostatic discharge (ESD)
- Safe handling practices

Special Facilities and/or Equipment

Laboratory with electrical tools and equipment, to include:

- Audio-visual equipment (slide, video, and overhead projectors)
- Hand benders for conduit
- Various hand tools for conduit bending
- Laptop computers
- Conduit benders

Method(s) of Evaluation

Methods of Evaluation may include but are not limited to the following:

Results of written quizzes and average of six tests
 Results of hands-on projects and homework
 Results of class participation
 Maintenance of a student's workbook with questions drawn from text

Method(s) of Instruction

Methods of Instruction may include but are not limited to the following:

Lecture
 Lab assignments
 Group discussion
 Demonstration

Representative Text(s) and Other Materials

NJATC. NJATC Orientation Workbook. 2009.

NJATC. NJATC Job Information-1 Workbook. 2010.

NJATC. DC Theory Textbook. 2012.

NJATC. NJATC DC Theory Blended Learning. 2012.

American Technical Publishers and NJATC. Conduit Bending and Fabrication. 2009.

Callanan, M.I., and B. Wusinich. Electrical Systems. 2020.

Although some texts are older than the suggested "5 years or newer" standard, they remain seminal texts in this area of study.

Types and/or Examples of Required Reading, Writing, and Outside of Class Assignments

- a. Reading assignment from the Electrical Systems based on the 2014 NEC
- b. Writing assignment from the Electrical Systems based on the 2014 NEC
 - i. Write articles on safety considerations per the National Fire Protection Association, NEC 2014. NFPA 70: National Electrical Code

Discipline(s)

Electricity