

# APEL 124A: DC/AC THEORY REVIEW; ELECTRONICS; INDUSTRIAL BLUEPRINTS; TRANSFORMERS, GROUNDING; ELECTRICAL SYSTEMS

## Foothill College Course Outline of Record

Heading	Value
<b>Units:</b>	5
<b>Hours:</b>	36 lecture, 84 laboratory per quarter (120 total per quarter)
<b>Prerequisite:</b>	Per California Code of Regulations, this course is limited to students admitted to the San Francisco Inside Wireman Electrical Program.
<b>Advisory:</b>	Not open to students with credit in APRT 124.
<b>Degree &amp; Credit Status:</b>	Degree-Applicable Credit Course
<b>Foothill GE:</b>	Non-GE
<b>Transferable:</b>	None
<b>Grade Type:</b>	Letter Grade (Request for Pass/No Pass)
<b>Repeatability:</b>	Not Repeatable

## Student Learning Outcomes

- To learn why and how grounding is important in the field of electricity
- To understand how a transformer works and why

## Description

Review of AC/DC theory. Study of electronics principles and applications, and industrial blueprint reading. Transformer installation, grounding and electrical systems.

## Course Objectives

The student will be able to:

- Differentiate and discuss AC/DC theory.
- Explain electronic principles and applications.
- Discuss and use industrial blueprints.
- Discuss transformer installation, grounding and electrical systems.

## Course Content

- AC/DC theory
  - Basic AC/DC electrical generation
  - DC series parallel circuits
  - AC/DC waveforms
  - Basic three-phase AC
- Electronic principles and applications
  - Current and voltage values
  - Calculating voltages and currents for load and windings
  - Use of wye or delta wiring schemes

- Functions, operation and characteristics of various types of distribution systems
- Industrial blueprints
  - Introduction: extension of basic and intermediate plan reading applied in an industrial setting
  - Specifications extension of basic and intermediate specification reading applied in an industrial setting
- Proper transformer, grounding procedures and electrical systems
  - Steps for receiving and preparing transformer for installation
  - Selection and installation of transformers and grounding
  - Function, operation and characteristics of transformers and grounding
  - Transformer and grounding of classifications and applications
  - Transformer and grounding losses
  - Electrical 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.

## Method(s) of Evaluation

- 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

- Lecture
- Lab Assignments
- Group Discussion
- Demonstration

## Representative Text(s) and Other Materials

[NJATC Residential Planning and Design Student Workbook](#). Upper Marlboro, MD: National Joint Apprenticeship and Training Committee for the Electrical Industry, 2011.

[Blueprint Reading for Electricians](#). 2nd ed. Clifton Park, NY: Delmar Cengage Learning, in partnership with the National Joint Apprenticeship and Training Committee for the Electrical Industry, 2009.

[Electrical Systems 2014 NEC](#). Orland Park, IL: American Technical Publishers.

[Transformer & Grounding Principles and Applications](#). Orland Park, IL: American Technical Publishers, 2010.

[NJATC Code and Work Practices 2](#). Upper Marlboro, MD: NJATC, 2014.

[NJATC Transformers Workbook](#). Upper Marlboro, MD: NJATC, 2010.

National Joint Apprenticeship and Training Committee for the Electrical Industry. [NJATC Residential Print Set](#). Upper Marlboro, MD: National Joint Apprenticeship and Training Committee for the Electrical Industry, 2009.

National Joint Apprenticeship and Training Committee for the Electrical Industry, International Brotherhood of Electrical Workers. [NJATC Commercial Print Set](#). Upper Marlboro, MD: National Joint Apprenticeship and Training Committee for the Electrical Industry, 2009.

Although one or more of these texts is older than the suggested "5 years or newer" standard, it remains a seminal text 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 2005 NEC and published by American Technical Publishers, Inc.

B. Writing assignment from the Electrical Systems based on the 2005 NEC.

1. Write articles on safety considerations per the National Fire Protection Association, NEC 2005. NFPA 70: National Electrical Code.

## **Discipline(s)**

Electricity