

# APEL 127: DIGITAL ELECTRONICS; MOTOR SPEED CONTROL; ADVANCED NATIONAL ELECTRICAL CODE

## Foothill College Course Outline of Record

Heading	Value
Effective Term:	Summer 2021
Units:	4
Hours:	24 lecture, 72 laboratory per quarter (96 total per quarter)
Prerequisite:	Per California Code of Regulations, this course is limited to students admitted to the Electrical Apprenticeship Program.
Advisory:	Not open to students with credit in APRT 127.
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

- A successful student will be able to install an electrical motor drive.
- A student will be able to pass the OSHA 30 hour certification exam.
- A student will be able to elaborate on construction and electrical safety regulations.

## Description

The use of Boolean algebra in the development of logic circuits and logic control. Introduction to the principles of motor speed control. Review of AC theory. Expanded coverage of the National Electrical Code.

## Course Objectives

The student will be able to:

- Use Boolean algebra.
- Explain principles of motor speed control.
- Discuss and illustrate AC theory.
- Explain and interpret select sections of the National Electrical Code.

## Course Content

- Boolean algebra
  - AND and OR logic
  - NAND and NOR logic
  - Positive and negative logic
- Principles of motor speed controls
  - DC motor speed control
  - Single phase AC motor speed control
  - Three-phase AC motor speed control
- AC theory
  - Series resonance

- Parallel resonance
- Series-parallel resonance
- Power quality and power harmonics
- National Electrical Code
  - Cable tray fill
  - Motor branch circuits
  - Motor branch circuit and motor overload protection
  - Sizing motor disconnect
  - Hazardous locations
  - Special occupancies
  - Electrical equipment
  - Special equipment

## Lab Content

- Students will properly wire a motor to variable speed drive and demonstrate the application.
- Using the National Electric Code, the students will select and install the proper overcurrent protection device to a AC motor.

## Special Facilities and/or Equipment

Laboratory with electrical tools and equipment.

## 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
- Class demonstrations

## Representative Text(s) and Other Materials

Johnston, M.J.. [Hazardous Locations](#). 2007.

American Technical Publishers, Inc.. [Motors, 2nd ed.](#). 2010.

National Joint Apprenticeship and Training Committee. [Fundamentals of Motor Control](#). 2010.

National Joint Apprenticeship and Training Committee. [Syllabus for Fourth Year Core Curriculum](#). 2014.

National Joint Apprenticeship and Training Committee. [Code and Practices -4 & 5 Student Blended Learning.](#). 2014.

National Joint Apprenticeship and Training Committee. [Hazardous Locations Student Workbook](#). 2006.

National Joint Apprenticeship and Training Committee. [Motors Student Blended Learning](#). 2005.

National Joint Apprenticeship and Training Committee. Motor Control Student Blended Learning. 2010.

These are the standard Electrical textbooks/workbooks used for this course. Although one or more may not be within 5 years of the required published date, they are the most current books used when teaching this course.

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

- A. Read Chapters 10-15 in "Syllabus for Fourth Year Core Curriculum" by the National Joint Apprenticeship and Training Committee (2014).
- B. Read Chapters 1-9 in "Fundamentals of Motor Control". Review sections covering three-phase AC motor speed control.
- C. Complete a logic diagram for both AND and OR logic gates.

## **Discipline(s)**

Electricity