College of San Mateo
Course Outline

☒ New Course
☐ Update/No change
☐ Course Revision (Minor)
☐ Course Revision (Major)

Date: 06/02/08

Department: ELEL **Number:** 734

Course Title: Electrical Apprenticeship IV **Units:** 1.5

Total Semester Hours: **Lecture:** 0.0 **Lab:** 90.0 **Homework:** 0.0 **By Arrangement:** 0.0

Length of Course

- ☐ Semester-long
- ☒ Short course (Number of weeks 15)
- ☐ Open entry/Open exit

Grading

- ☒ Letter
- ☐ Pass/No Pass
- ☐ Grade Option (letter or Pass/No Pass)

1. **Prerequisite** (Attach Enrollment Limitation Validation Form.)

Indenture in the Electrical Apprenticeship Inside Wireman Program, approved by the California State Division of Apprenticeship Standards.

2. **Corequisite** (Attach Enrollment Limitation Validation Form.)

None

3. **Recommended Preparation** (Attach Enrollment Validation Form.)

None

4. **Catalog Description** (Include prerequisites/corequisites/recommended preparation.)

734 Electrical Apprenticeship IV (1.5)
(Formerly ELEL 704) 90 lab hours per semester. Prerequisite: Indenture in the Electrical Apprenticeship Inside Wireman Program, approved by the California State Division of Apprenticeship Standards. Second half of year two of a five-year Electrical Apprenticeship Program. AC circuits, RLC circuits, power factor, electrical transformers, building/structure conductors.

5. **Class Schedule Description** (Include prerequisites/corequisites/recommended preparation.)

734 Electrical Apprenticeship IV
Second half of year two of a five-year Electrical Apprenticeship Program. AC circuits, RLC circuits, power factor, electrical transformers, building/structure conductors. Formerly ELEL 704. Prerequisite: Indenture in the Electrical Apprenticeship Inside Wireman Program, approved by the California State Division of Apprenticeship Standards.

6. **Student Learning Outcomes** (Identify 1-6 expected learner outcomes using active verbs.)

Upon successful completion of the course, the student will be able to:

Recognize and interpret NEC codes
Recognize the major attributes of Alternating Current (AC)
Recognize the major attributes of Power Factor Calculation
Recognize the fundamental function of Alternating Current (AC) Transformers

7. **Course Objectives** (Identify specific teaching objectives detailing course content and activities. *For some courses, the course objectives will be the same as the student learning outcomes. If this is the case, please simply indicate this in this section).*

Apply the knowledge and skills necessary to perform the job assignments expected of a second year inside wireman apprentice.

8. **Course Content** (Brief but complete topical outline of the course that includes major subject areas [1-2 pages]. Should reflect all course objectives listed above. In addition, you may attach a sample course syllabus with a timeline.)

See Attached Topical Outline

9. **Representative Instructional Methods** (Describe instructor-initiated teaching strategies that will assist students in meeting course objectives. Include examples of out-of-class assignments, required reading and writing assignments, and methods for teaching critical thinking skills.) **If hours by arrangement are required by this course, indicate the additional instructional activity which will be provided during this time.**

Reading Assignments
Workbook Lab Assignments

10. **Representative Methods of Evaluation** (Describe measurement of student progress toward course objectives. Courses with required writing component and/or problem-solving emphasis must reflect critical thinking component. If skills class, then applied skills.)

Completion of lab homework
Examination upon completion of each unit
Demonstrated competency by successful completion of lab assignments

11. **Representative Text Materials** (With few exceptions, texts need to be current. Include publication dates.)

See Attached List

Prepared by: _____
(Signature)

Email address: schneider@smccd.edu

Submission Date: _____

I. The Understanding and Effect of Reactance on an AC Circuit
   - A. Introduction to Inductive Reactance
   - B. Applied Inductors in series, parallel, and combination AC Circuit
   - C. Introduction to Capacitive Reactance
   - D. Applied capacitors in series, parallel, and combination AC Circuit

II. Understanding the Basic Characteristics of AC Circuits
   - A. Parameters of Series RL Circuits
   - B. Understanding and Recognizing Voltage, Impedance, Current and Frequency in a Series RL Circuit
   - C. Understanding and Applying Voltage, Impedance, Current and Frequency in a Parallel RL Circuit
   - D. Parameters of Series RC Circuits
   - E. Understanding and Recognizing Voltage, Impedance, Current and Frequency in a Series RC Circuit
   - F. Understanding and Applying Voltage, Impedance, Current and Frequency in a Parallel RC Circuit
   - G. Parameters of LC Circuits
   - H. Understanding and Applying Series LC Circuits, Voltage, Impedance, Current and Frequency

III. Understanding and Analyzing RLC Circuits
   - A. Parameters of Series RLC Circuits for Voltage, Impedance, Current, and Resonance
   - B. Determine Q and Bandwidth in a Series RLC Circuit
   - C. Analyzing and Applying Combination RLC Circuits for Voltage, Impedance, Current

IV. Understand and Apply Filters to AC Circuits
   - A. Difference Between Low Pass Filter Design, High Pass Filter Design
   - B. Recognize Band Pass Filter Analysis and Band Reject Filter Analysis

V. Understand and Apply Power Factor
   - A. Understand and Calculate Power Factor
   - B. Understand and Calculate Power Factor Corrections

VI. Understand the Fundamental Function of Electrical Transformers
   - A. Identify and Apply Single-Phase Transformer Connections
   - B. Understand the Function of Step-up/Step-down Transformers and Primary/Secondary Windings
   - C. Applying Transformer Windings to Provide Different Voltages
   - D. Understand and Recognize Proper Transformer Installation Procedures
   - E. Identify and Apply Three-Phase Transformer Connections
   - F. Understand and Recognize Delta-Delta Connected Transformers, Delta-Wye Transformers, and Three-Phase Buck-Boost Transformers

VII. Principals Involved in Sizing Building/Structure Conductors in Accordance with NEC Code
   - A. Calculation of Conductor Ampacity
   - B. Design and Calculation of Conductor Branch Circuits
   - C. Design and Calculation of Electrical Service
   - D. Design and Calculation of Lighting and Receptacles
   - E. Comprehending the NEC's Requirements for Cable Assemblies
   - F. Applying Wiring Methods for General and Specific Installation

Representative Text Materials – ELEL 734

Callanan, Michael I., and Bill Wusunich. Electrical Systems Based on the 2005 NEC. Homewood, Illinois: American Technical Publisher, Inc., 2005.

Mazur, Glen A. Test Instruments Applications Manual. Homewood, Illinois: American Technical Publisher, Inc. 2006.

National Fire Protection Associates, Inc. National Electric Code 2005. Quincy, Massachusetts: NFPA, 2004.

National Joint Apprenticeship and Training Committee. AC Theory. Clifton Park, New York: Delmar Learning, 2004.

National Joint Apprenticeship and Training Committee. AC Theory Workbook. Upper Marlboro, Maryland: NJATC Press, 2005.

National Joint Apprenticeship and Training Committee. Applied Codeology. Clifton Park, New York: Thomson/Delmar Learning, 2005

National Joint Apprenticeship and Training Committee. Codeology Workbook . Upper Marlboro, Maryland: NJATC Press, 2005.

National Joint Apprenticeship and Training Committee. Codes and Practices Workbook 2. Upper Marlboro, Maryland: NJATC Press, 2005.

National Joint Apprenticeship and Training Committee. Job Information Workbook 2. Upper Marlboro, Maryland: NJATC Press, 2005.

National Joint Apprenticeship and Training Committee. Test Instruments Workbook. Upper Marlboro, Maryland: NJATC Press, 2005.