Modesto Junior College
Course Outline of Record
INTEC 248

I. **OVERVIEW**
The following information will appear in the 2010 - 2011 catalog

INTEC 248  Electrical Codes and Ordinances  3 Units

*Interpretation and application of national, state and local codes and ordinances which
regulate the installation and maintenance of electrical circuits and equipment. This course
may be repeated up to four completions. Formerly listed as INDED 393.*

Four maximum completions.
Field trips might be required.  (A-F Only) Lecture
Transfer: (CSU)

II. **LEARNING CONTEXT**
*Given the following learning context, the student who satisfactorily completes this course should be able to achieve the
goals specified in Section III, Desired Learning:*

A. **COURSE CONTENT**

1. **Required Content:**

   A. California Energy Code
   B. Cal-OSHA Requirements
   C. Modesto City Code
   D. Local Municipal County Codes
   E. Inspection
      1. Municipal or Governmental
      2. Engineer/Architect
      3. State registered inspectors
      4. Owner's inspectors
   F. Definitions and General Provisions
   G. Wiring Design and Protection
      1. Branch circuits
      2. Feeder circuits
      3. Services
      4. Overcurrent protection
      5. Grounding
   H. Grounding Requirements
      1. Circuits to be grounded
      2. Equipment to be grounded
      3. Bonding
      4. Conductor sizing
   I. Surge Arrestors
   J. Electrical Equipment and Conductor Capacities
      1. Conductor ratings
      2. Service sizing
      3. Feeder sizing
      4. Branch circuit sizing
K. Wiring Methods and Materials
   1. Wire types and ampcalities
   2. Cable installation
   3. Conduit installations
   4. Underfloor raceways
   5. Wireways
   6. Busways
   7. Devices
   8. Panelboards and switchboards

*Second completion
National Electrical Code is updated every three years. Content of second completion covers updated electrical codes and ordinances.

*Third completion
National Electrical Code is updated every three years. Content of third completion covers updated electrical codes and ordinances.

*Fourth completion
National Electrical Code is updated every three years. Content of fourth completion covers updated electrical codes and ordinances.

B. HOURS AND UNITS

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C. METHODS OF INSTRUCTION (TYPICAL)
   Instructors of the course might conduct the course using the following method:
   1. Classroom instruction.
   2. Equipment and technology demonstrations.
   3. Video presentations.
   4. Case studies.
   5. Field trip.
   6. Guest speaker.
   7. Computer based tutorials.

D. ASSIGNMENTS (TYPICAL)

1. EVIDENCE OF APPROPRIATE WORKLOAD FOR COURSE UNITS
   Time spent on coursework in addition to hours of instruction (lecture hours)
   a. Weekly homework and reading assignments.
   b. Weekly workbooks or handouts.
   c. Mid-term case-study assignments.
   d. Per term field case-study.
e. Per term and/or mid-term examination preparation and study.

2. **EVIDENCE OF CRITICAL THINKING**  
*Assignments require the appropriate level of critical thinking*

Typical exam questions:

**Regarding Article 220 Branch-Circuit, Feeder and Service Calculations:**
For other than dwelling occupancies, each receptacle outlet shall be computed at not less than how many volt-amperes for each single or each multiple receptacle on one yoke?

The feeder service and service conductors for motors shall be computed in accordance with which article?

For identically sized ranges rated more than 12 kW but not more than 27 kW, the maximum demand in column C shall be increased by what percent of the column C value for each additional kilowatt that the individual ranges exceed 12 kW?

When applying the demand factors of Table 220.20, in no case shall the feeder or service demand load be less than the sum of what?

What is the feeder demand load for nine 12 kW ranges?

**Regarding Article 240 Overcurrent Protection:**
Circuit breakers shall be capable of being closed and opened by manual operation. Their normal method of operation by other means, such as electrical or pneumatic shall be permitted if what other means of operation are provided?

Circuit breakers shall clearly indicate whether they are in the open "off" or closed "on" position. Where the circuit breaker handles are operated vertically the "up" position of the handle shall be what position?

**Regarding Article 250 Grounding:**
AC systems of 50 to 1,000 volts that supply premises wiring systems shall be grounded where the system can be grounded so that the maximum voltage to ground on the ungrounded conductors does not exceed how many volts?

Where none of the items in 250.52(A)(1) through (A)(6) are available for use as a grounding electrode, one or more of which type of devices shall be installed and used as the grounding electrode?

E. **TEXTS AND OTHER READINGS (TYPICAL)**


III. **DESIRED LEARNING**

A. **COURSE GOAL**
*As a result of satisfactory completion of this course, the student should be prepared to:*

   correctly locate, interpret, and apply current national, state, and local codes and ordinances to specific installations and maintenance needs for electrical circuits and equipment.

B. **STUDENT LEARNING GOALS**
*Mastery of the following learning goals will enable the student to achieve the overall course goal.*
1. Required Learning Goals
   Upon satisfactory completion of this course, the student will be able to:
   
   a. Distinguish between the types of grounding techniques
   
   b. Evaluate and assess the problems encountered in the grounding of an electrical wiring installation.
   
   c. Research the Cal-OSHA codes requirements for specific electrical equipment.
   
   d. Evaluate and assess the problems encountered in the installation of surge arrestors.
   
   e. Design a system that incorporates the various devices and equipment used in a typical wiring service unit.
   
   f. Inspect a building site and evaluate compliance with local and state regulations.
   
   g. Summarize and explain the responsibilities of various inspecting agencies.
   
   h. Interpret the codes and ordinances as they relate to specific residential wiring materials.
   
   i. Correctly identify the appropriate sizes of electrical conductor capacities for specific equipment types.
   
   j. Second Completion
   
   k. Identify and explain and recent updates to the National Electrical Code.
   
   l. Third Completion
   
   m. Identify and explain recent updates to the National Electrical Code.
   
   n. Fourth Completion
   
   o. Identify and explain recent updates to the National Electrical Code.

IV. METHODS OF ASSESSMENT (TYPICAL)

A. FORMATIVE ASSESSMENT

   1. Graded weekly homework assignments.
   
   2. Quizzes

B. SUMMATIVE ASSESSMENT

   1. Mid Term and Final Exams
   
   2. Group case study analysis
   
   3. Case study analysis
   
   4. Small group class presentations