

FLORIDA STATE COLLEGE AT JACKSONVILLE

NON-COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: EEV 0175
COURSE TITLE: Industrial Wiring
PREREQUISITE(S): None
COREQUISITE(S): None
TOTAL CONTACT HOURS: 60

(For Office Use Only:
Vocational Credits 2)

FACULTY WORKLOAD POINTS: 2
STANDARDIZED CLASS SIZE
ALLOCATION: 24

COURSE DESCRIPTION:

This course is designed to teach entry-level job skills. Topics include plans and site plans, National Electrical Code (NEC) requirements for industrial wiring, and hazardous location installation.

SUGGESTED TEXT(S): Electrical Wiring, Industrial, Latest Edition, Robert L. Smith & Stephen L. Herman, Delmer, Pub.
IMPLEMENTATION DATE: Winter Term, 1994 (942)
REVIEW OR MODIFICATION DATE: Spring Term, 2002
Fall Term, 2006 (20071)

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
I. Plans and Site-work	2
A. Construction Plans	
(1) symbols	
(2) interpretation	
B. Site Plans	
(1) symbols	
(2) interpretation	
II. Feeder Bus System	1
A. Panel-boards	
B. Trolley Bus-ways	
III. NEC Wire Tables and Determining Conductor Size	8
A. Conductors	
B. Insulation Types	
C. Correction Factors	
D. De-rating	
E. Underground Conductors	
F. Computing Conductor Sizes And Resistance	
G. Voltage Drop	
H. Parallel Conductors	
I. Computing Resistance	
J. Testing Wire Installations	
IV. Signaling Systems	1
A. Master Clock System	
B. Program System	
C. Paging System	
D. Fire Alarm System	
V. Special Equipment	2
A. Precipitation Unit	
B. Fan Assembly	
C. Loading on AC Circuits	
D. Power Factor Measurement	
E. Synchronous Condensers	
F. Tie-in	
G. Correcting Power Factor with Capacitors	
H. Correcting Motor Power Factor	
I. Installing Capacitors	
J. Testing Capacitors	

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
VI. Ventilating, Air Conditioning, and Other Facilities	2
A. Ventilator and Exhaust System	
B. Cooling Equipment	
C. Liquid Chillers	
VII. System Protection	2
A. Circuit	
B. Circuit Breaker, Fuse, and Ground-fault	
VIII. Industrial Lighting	3
A. Protection	
B. Lamp Selection	
C. Luminance Selection	
D. Power Limitation	
E. Lamina Placement	
F. Electrical Installations	
IX. Hazardous Locations	2
A. Intrinsically Safe Circuits and Equipment	
B. Equipment Approval	
C. Hazardous Areas	
D. Installation and Maintenance of Explosion-proof Equipment	
X. Introduction to Transformers	3
A. Principles of Magnetism	
B. Operation	
C. Construction	
D. Types of Cores	
XI. Transformation	2
A. Current	
B. Resistance	
C. Reactance	
D. Losses	
XII. Types of Transformers	2
A. Dry	
B. Oil Filled	

C. Wiring Diagrams

COURSE TOPICS	<u>CONTACT HOURS PER TOPIC</u>
D. Taps(connections) E. Markings F. Testing	
XIII. Transformer Applications	2
A. Multi-coil B. Autotransformer C. Isolation D. Variable (vari-ac) E. Step-up F. Step-down	
XIV. 3 Phase Power Distribution	2
A. Wye (star) Connection (1) voltages (2) Current (3) power	2
B. Delta Connection (1) voltage (2) current (3) power	2
C. Terminology	2
D. Measurements E. Calculations	
F. National Electrical Code (NEC) Requirements	3
XV. Test Equipment	3
A. Scope-meters B. Digital Clamp-on Ammeters C. Multi-meters D. Meg-ohm meters (meggers) E. Capacitor Checkers	
XVI. Motors and Controls	14
A. Types of motors B. Types of control (1).2-wire (2).3-wire C. Drives (1).DC	

(2).variable frequency (AC)

XVII. Installation requirements for Water bottling equipment	15
Total Contact Hours	60

PROGRAM TITLE: Industrial Maintenance Technology

COURSE TITLE: Industrial Wiring

CIP NUMBER: 0646.030203

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S): TITLES(S):

01.0 IDENTIFY SAFE WORKING CONDITIONS AT THE LABORATORY AND WORKPLACE, AND OBSERVE SAFETY PRECAUTIONS--The student will be able to:

- 01.01 Clean the work area and maintain it in a safe condition.
- 01.02 Apply lab policies and procedures for safety, including fire safety.
- 01.03 Identify and operate workplace-safety electrical devices.
- 01.04 Identify health-related problems that may result from exposure to work-related chemicals and hazardous materials, and know the proper precautions required for handling such materials.
- 01.05 Demonstrate procedures for disaster situations.
- 01.06 Demonstrate the proper use and care of hand and power tools and equipment.
- 01.07 Demonstrate knowledge of CPR (cardiopulmonary resuscitation) and first aid.
- 01.08 Troubleshoot residential electric circuits.
- 01.09 Drill holes in metal, wood, and concrete for electrical wiring.
- 01.10 Identify and select tools, equipment, materials, and wires to complete a job.
- 01.11 Lay out electrical devices, complying with regulations.
- 01.12 Install the following, complying with the appropriate local, state, or national electric codes:
 - a. Conductors and cable
 - b. Standard outlets and switch boxes
 - c. Explain cord connections on major appliances
 - d. Cords switches, receptacles, and dimmers, including a single-pole switched lighting circuit, a three-way switched lighting circuit, and a four-way combination circuit.

02.0 DEMONSTRATE AN UNDERSTANDING OF BASIC DIRECT-CURRENT (DC) ELECTRICAL-CIRCUIT SKILLS--The student will be able to:

- 02.01 Define the terms "voltage," "current," "resistance," "power," and "energy."
- 02.02 Measure voltage, amperage, and resistance, using a volt-ohm meter (VOM) and a digital volt-ohm meter (DVM).
- 02.03 Analyze, and explain a series, series-parallel, and parallel circuit.
- 02.04 Draw each type of circuit and calculate the circuit values.
- 02.05 Explain and apply Ohm's Law.
- 02.06 Compute conductance and resistance of conductors and insulators.
- 02.07 Read and interpret color codes to identify resistors.
- 02.08 Explain voltage dividers (loaded and unloaded).

LIST PERFORMANCE STANDARD ADDRESSED: (Continued)

NUMBER(S): TITLES(S):

07.0 READ AND INTERPRET BASIC ELECTRIC CODES--The student will be able to:

- 07.01 Describe the importance of following the local, state and national electric codes.
- 07.02 Read and interpret basic electric codes, wiring plans and specifications.
- 07.03 Identify licensure requirements for electrical occupations.

10.0 DEMONSTRATE COMPETENCY IN INDUSTRIAL WIRING--The student will be able to:

- 10.01 Draw an industrial one-line power diagram.
- 10.02 Test insulation resistance using a megohm meter.
- 10.03 Install a motor branch circuit.
- 10.04 Using the National Electrical Code (NEC), make the following required calculations:
 - a. Conductor size
 - b. Overcurrent protection
 - c. Overload protection
 - d. Short circuit protection
- 10.05 Install a 277v lighting branch circuit.
- 10.06 Describe a bus duct power distribution system.
- 10.07 Describe fiber-optic installation requirements.
- 10.08 Demonstrate the use of industrial test equipment.
- 10.09 Install the following:
 - a. Disconnect switch - fused and unfused
 - b. Raceways
 - c. Emergency stop switch
 - d. Circuit breaker
 - e. Panelboard

11.0 DEMONSTRATE COMPETENCY IN TRANSFORMERS--The student will be able to:

- 11.01 Explain the basic principles of mutual induction and transformer action.
- 11.02 Explain the operation and use of a current transformer.
- 11.03 Explain the operation and use of a potential transformer.
- 11.04 Explain the operation and use of a buck-boost transformer and when it is used.
- 11.05 Explain and connect 3 phase transformers in both delta and wye configuration.
- 11.06 Calculate the over current protection requirements for the primary and secondary.
- 11.07 Explain what transformer impedance is and it's importance.