

## Electrical

### Level IV Unit Outline

#### **Unit 1: Agenda Book Review/Classroom Rules**

- Class discussion of student agenda book
- Review of classroom rules
- School safety protocols, district drills and emergency evacuations, behavior and meeting locations
- Review expectations and school policies for electronic devices

#### **Unit 2: Safety, First Aid, Personal Protective Equipment and Shop Attire**

- Identify, discuss, locate first aid and bloodborne kits
- Identify, locate and demonstrate function and purpose of the Emergency Eye Station
- Identify, discuss, locate fire extinguisher
- Identify, distribute and discuss function and uses of protective eyewear, appropriate personal protective equipment (PPE) required in shop, and acceptable shop attire
- Identify, show location and discuss function and uses of the SDS (Safety Data Sheets) and how to interpret the information about paints and aerosols, content precautions, material labeling
- Equipment safety protocols
- Identify, demonstrate shop ventilation systems where applicable
- Identify locate and discuss function of shop flammable cabinet where applicable
- Discuss and demonstrate shop housekeeping of supplies, work stations and room maintenance
- Discuss and identify electrical safety considerations in the shop area
- Compile a safety section in the student shop notebook
- Identify, demonstrate air gauge function and operation where applicable
- Completion of online safety course and successful passing of safety test(s)
- OSHA 10 Certification
  - Intro to OSHA - 1 hour
  - OSHA Focus - 4 hours
    - Electrocution - 1 hour
    - Struck by - 45 minutes
    - Stuck in - 45 minutes
    - Falls - 1.5 hours
  - PPE - 30 minutes
  - Health Hazards in Construction - 30 minutes

- Stairway/ Ladders - 1 hour
- Tools - 1 hour
- Material Handling - 30 minutes
- Safety & Health Program - 30 minutes
- Welding/Cutting - 30 minutes
- Fire Protection/Prevention - 30 minutes

Total hours 10 hours

### **Unit #3: Residential Electrical Systems II**

- Ability to read floor plans used in a residential setting
- Grasp concepts related to general lighting loads in a residential setting
- Understanding of small appliance circuits in a residential setting
- Ability to make accurate and proper calculations and tables for lighting and circuit loads
- Ability to make accurate and proper calculations in service entrances

### **Unit #4 – Commercial Electrical Systems II**

- Learn concepts relating to equipment loads
- Learn concepts relating to motor loads
- Discuss concepts of sign lighting
- Discuss concept of site lighting
- Ability to determine transformer and service calculations

### **Unit #5 – Three Phase Service Installations II**

- Understanding of Transformer Configurations and Voltages – Delta, Open Delta, Wye, Delta to wye Transformers
- Explore three phase Sign Wave and power factors
- Ability to identify voltage
- Understanding of NEC Requirements for Transformers
- Safety – testing three phase power phase to phase and phase to ground

### **Unit #6 – Tools and Equipment II**

- Learn proper and safe use of Cad Welding tools and supplies
- Learn proper and safe use of core boring equipment
- Learn concepts related to transit and level

### **Unit #7 – Industrial Power Systems II**

- Explore concepts of subpanel locations

- Discuss panel, pull box, and gutter sizing – wires deflection

#### **Unit #8 – Motor and Motor Control II**

- Learn principles motor power factor and operating voltages
- Learn principles of motor controller types and sizing
- Ability to make proper calculations for motor feeders
- Explore single and multi-stop start locations
- Understanding of motor assemble and disassembly (lab volt center)

#### **Unit #9 – Motor Control Circuits II**

- Explore the interconnection of manual and automatic control circuits

#### **Unit # 10 – Special Control Circuits II**

- Explore principles of phase monitors

#### **Unit #11 – Solid State Motor Control II**

- Explore conventional magnetic starters

#### **Unit #12 – Commercial and Industrial Power Distribution II**

- Knowledge of taps and NEC requirements
- Discuss means of support – hardware and devices

#### **Unit #13 – Industrial Lighting II**

- Understanding of methods of supporting luminaires per NEC
- Understanding of lighting load diversity and grounded conductor sizing
- Safety related to capacitors, ballasts, and servicing H.I.D. fixtures

#### **Unit #14 – Related Commercial and Industrial Electrical Systems II**

- Discuss principles associated with Air Handlers
- Explore the NEC requirement for Conductor Sizing and Overcurrent Protection Sizing
- Express importance of safety in working with Heavy Equipment and three phase power systems

#### **Unit #15 – Data and Communication Wiring II**

- Discuss NEC Requirements in Cable Selection and Fire Rating
- Safety relating to cable installations in various parts of a dwelling or structure

## **Unit #16 – Electrical Contractor License II**

- Board of Electrical Examiners
- Application Process for State Contractors Exam
- Knowledge of the State of New Jersey Contractors License & Business Permit
- Discussion of Post-Secondary Placements for Two and/or Four-Year Colleges
- Explore syllabuses and degree requirements for various programs

Electrical  
New Jersey Student Learning Standards (NJSL)

**NJ Learning Standards: CTE.9.3**

<b>CONTENT AREA:</b>	<b>STANDARD 9.3 CAREER AND TECHNICAL EDUCATION</b>
<b>ARCHITECTURE &amp; CONSTRUCTION CAREER CLUSTER®</b>	
<b>Number</b>	<b>Standard statement</b>
<i>By the end of Grade 12, Career and Technical Education Program completers will be able to:</i>	
<b>CAREER CLUSTER®:</b>	<b>ARCHITECTURE &amp; CONSTRUCTION (AC)</b>
<b>9.3.12.AC.1</b>	<b>Use vocabulary, symbols and formulas common to architecture and construction.</b>
<b>9.3.12.AC.2</b>	<b>Use architecture and construction skills to create and manage a project.</b>
<b>9.3.12.AC.3</b>	<b>Comply with regulations and applicable codes to establish and manage a legal and safe workplace.</b>
<b>9.3.12.AC.4</b>	<b>Evaluate the nature and scope of the Architecture &amp; Construction Career Cluster and the role of architecture and construction in society and the economy.</b>
<b>9.3.12.AC.5</b>	<b>Describe the roles, responsibilities, and relationships found in the architecture and construction trades and professions, including labor/management relationships.</b>
<b>9.3.12.AC.6</b>	<b>Read, interpret and use technical drawings, documents and specifications to plan a project.</b>
<b>9.3.12.AC.7</b>	<b>Describe career opportunities and means to achieve those opportunities in each of the Architecture &amp; Construction Career Pathways.</b>
<b>PATHWAY:</b>	<b>CONSTRUCTION (AC-CST)</b>
<b>9.3.12.AC-CST.1</b>	<b>Describe contractual relationships between all parties involved in the building process.</b>
<b>9.3.12.AC-CST.2</b>	<b>Describe the approval procedures required for successful completion of a construction project.</b>
<b>9.3.12.AC-CST.3</b>	<b>Implement testing and inspection procedures to ensure successful completion of a construction project.</b>
<b>9.3.12.AC-CST.4</b>	<b>Apply scheduling practices to ensure the successful completion of a construction project.</b>
<b>9.3.12.AC-CST.5</b>	<b>Apply practices and procedures required to maintain jobsite safety.</b>
<b>9.3.12.AC-CST.6</b>	<b>Manage relationships with internal and external parties to successfully complete construction projects.</b>
<b>9.3.12.AC-CST.7</b>	<b>Compare and contrast the building systems and components required for a construction project.</b>
<b>9.3.12.AC-CST.8</b>	<b>Demonstrate the construction crafts required for each phase of a construction project.</b>
<b>9.3.12.AC-CST.9</b>	<b>Safely use and maintain appropriate tools, machinery, equipment and resources to accomplish construction project goals.</b>