CTE Reapproval Self-Study Report

ELECTRICAL TRADES

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Self-study

> *Self-study is the first step in the career and technical education approval process. The self-study review is required for all existing programs and new programs seeking approval. Its purpose is to bring together partners to review the CTE program, propose relevant modifications, and evaluate the degree to which the program meets the policy requirements approved by the Board of Regents on February 6, 2001.*

Self-study review will include:

Curriculum review

Benchmarks for student performance and student assessment

Teacher certification and highly-qualified status of instructional staff

Work-based learning opportunities

Teacher and student schedules

Resources, including staff, facilities, and equipment

Accessibility for all students

Work skills employability profile

Professional development plans

Projected number of students to be served

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

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Electrical Trades

Quick Facts: Electricians	
2017 Median Pay	$54,110 per year $26.01 per hour
Typical Entry-Level Education	High school diploma or equivalent
Work Experience in a Related Occupation	None
On-the-job Training	Apprenticeship
Number of Jobs, 2016	666,900
Job Outlook, 2016-26	9% (As fast as average)
Employment Change, 2016-26	59,600

What Electricians Do
Electricians install, maintain, and repair electrical power, communications, lighting, and control systems in homes, businesses, and factories.

Work Environment
Electricians work indoors and outdoors in nearly every type of facility. Almost all electricians work full time, which may include evenings and weekends. Potential on-the-job injuries include electrical shocks and burns, cuts, and falls.

How to Become an Electrician
Most electricians learn through an apprenticeship, but some start out by attending a technical school. Most states require electricians to be licensed.

Pay
The median annual wage for electricians was $54,110 in May 2017.

Job Outlook
Employment of electricians is projected to grow 9 percent from 2016 to 2026, about as fast as the average for all occupations. As homes and businesses require more wiring, electricians will be needed to install the necessary components.

Similar Occupations

Occupational Title	SOC Code	Employment, 2016	Projected Employment, 2026	Change, 2016-26	
				Percent	Numeric
Electrical and electronics engineering technicians	17-3023	137,000	139,800	2	2,700
Electrical engineers	17-2071	188,300	204,500	9	16,200
Electronics engineers, except computer	17-2072	136,300	141,300	4	5,100
Electrical power-line installers and repairers	49-9051	120,900	137,700	14	16,800
Solar photovoltaic installers	47-2231	11,300	23,100	105	11,800

Bureau of Labor Statistics, U.S. Department of Labor, *Occupational Outlook Handbook* on the Internet at: https://www.bls.gov/ooh/ (visited *February 06, 2019*).

New York State Employment Outlook

Occupational Title	SOC Code	Employment, 2016	Projected Employment, 2026	% Change, 2016-26	Annual projected job openings
Electricians	47-2111	43,780	49,530	13	5,670
Electrical and electronics engineering technicians	17-3023	6,070	6,410	6	560
Electrical engineers	17-2071	11,600	13,130	13	930
Electronics engineers, except computer	17-2072	3,910	4,170	7	280
Electrical power-line installers and repairers	49-9051	5,150	5,740	12	480
Solar photovoltaic installers	47-2231	830	1,700	105	300

CareerOneStop, U.S. Department of Labor, Employment and Training Administration on the internet at: https://www.careeronestop.org/Toolkit/Careers/Occupations/occupation-profile (visited February 06, 2019)

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A. Curriculum Review

> *The curriculum review is a step in the self-study process. It is an opportunity for members of the self-study team to evaluate the proposed curriculum for completeness in terms of the knowledge, skills, and competencies required in the program field. The team reviews the curriculum to ensure that course content in the career and technical education program meets State Education Department regulations, contributes to achievement of state and industry standards, and prepares students for successful completion of a technical assessment. Approved curriculum content is nonduplicative, challenging, organized along a continuum of difficulty, and free of bias.*
>
> *CTE program approval does not constitute Department approval or endorsement of proprietary curriculum or related curriculum products. Program approval indicates only that a school district or BOCES has provided the Department with assurances that the curriculum review has been completed.*

Process

- The school district or BOCES identifies the faculty members and other individuals who will be involved in conducting the curriculum review
- The school district or BOCES determines the procedures used in completing the curriculum review
- Reviewers confirm that CTE program content aligns with state CDOS standards, relevant state academic standards, and related business and industry standards
- Reviewers confirm that CTE program content includes integrated or specialized units of credit
- Reviewers confirm that the CTE program meets unit of credit and other distributive requirements

Documentation

Documentation of the curriculum review is maintained by the school district or BOCES and is updated whenever modifications are made to the approved CTE program. Recommendations from curricular review should be included in the self-study report and reviewed by the external committee.

Resources

New York State graduation requirements

http://www.emsc.nysed.gov/part100/pages/1005.html

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

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Syracuse City School District
Career and Technical Education Program
Course Syllabus
ELT100: Electrical Trades 100

Program Overview

The Electrical Trades Program is a four-year pathway designed to teach students the fundamentals of electricity theory, wiring methods and materials, national and local electrical codes, and print layout, the use of tools and electrical test equipment, the basics of electrical wiring and electrical construction according to the National Electric Code, OSHA 10 Construction Safety certification, and career ready workplace skills. Successful students will have the necessary experience to install receptacles, switches, lighting, and service entrance conductors and work with motors, generators and meters. In the classroom, students will learn both basic electrical theory and get practical hands-on experience, including completing a work-based internship in a local business. Throughout the program students will work both individually and as part of a team to complete assignments and projects. Safety will be given the highest priority at all times as students are working in the classroom. Upon successful completion of the Electrical Trades Program students will be able to obtain entry-level jobs in residential and commercial wiring. Students will also be prepared to continue training and education through post-secondary electrical technology programs at the college level or through private or electrical union apprenticeship programs.

Course Description

Electrical Trades 100 is an introductory course designed to give students a general overview of the Electrical Industry. This class is a pre-requisite for Electrical Trades 200, 300 and 400. The course includes an introduction to career opportunities, basic workplace safety, and an introduction to the tools and materials in the electrical trades.

Pre-Requisites

N/A

Course Objectives

1. Students will know the different types of jobs available in the electrical field.
2. Students will know the importance and seriousness of safety when working with electricity.
3. Students will have a foundational knowledge of electrical hand and power tools and their uses.
4. Students will have a foundational knowledge of electrical materials and their purposes.

Integrated Academics

N/A

Equipment and Supplies

- **School will provide:** Complete set of electrical hand tools, power tools, and personal protective equipment.
- **Student will provide:** work boots or safety shoes

Textbook

Henke-Konopasek, Nancy and Harvey N. Holzman. *Modern Residential Wiring, 10th Edition*. Tinley Park, IL: Goodhear-Wilcox Company, Inc., 2015. (Workbook)

Holzman, Harvey N. *Modern Residential Wiring, 10th Edition*. Tinely Park, IL: Goddheart-Willcox Co., Inc., 2015. (Textbook)

Grading

20% Quizzes/Projects
10% Homework
50% Weekly Participation
20% Tests

Additional Course Policies

Student attendance is very important due to the mandatory hours required for the national assessment. The absentee policy is strictly enforced.

Course Calendar

Quarter	Units of Study
1	• Electrical Orientation • Electrical Safety
2	• Electrical Mathematical Fundamentals
3	• Power Tools and Safety
4	• Hand Tools and Safety • Electrical Materials: Identification and Uses • Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
ELT100: Electrical Trades 100

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-12 **Electrical Orientation** **Electrical Safety**	• What are the expectations of the Electrical Trades program? • What are some of the career paths within the electrical industry? • Why is safety important in the electrical industry? • What do I need to know to keep myself and others safe in the shop? • What Personal Protective Equipment (PPE) is used by electricians? • What should be done to treat electrical shock? • What organizations create the rules and regulations for the electrical industry?	• Discuss program expectations • Research the career pathways in the electrical industry. • List rules for general classroom and shop safety. • Explain and follow basic classroom safety rules and procedures. • Identify and demonstrate proper use of required PPE • Explain a lockout/tagout/blockout program. • Understand the effects of electrical shock. • Describe conditions likely to affect severity of electrical shock. • Describe steps for helping a shock victim. • Explain OSHA safety requirements for working in the electrical industry. • Explain the importance of the rules, regulations, and criteria for the installation of electrical equipment of National Electrical Code.	**Written** • Daily, Weekly and Quarterly Assignments • Research Project on Five Sources of Energy • Quizzes • Written Exam on OSHA Safety Regulations (Must be passed before student can start the next unit.) • Portfolio Design and Set-Up • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on PPE	**Career Ready Practices** CRP 1,2,3,4 **Cluster Standards** AC 1,3 **Pathway Standards** AC-CST 5,9 AC-DES 2,4 AC-MO 1,6	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7 **Math**
Weeks 13-20 **Electrical Mathematical Fundamentals**	• How is mathematics used in the electrical industry? • What algebraic equations are needed to complete electrical tasks?	• Identify the practical applications of math in the electrical industry. • Demonstrate problem-solving techniques involving whole numbers, fractions, and decimals, using addition, subtraction, multiplication, and division. • Demonstrate techniques for converting fractions to decimals and decimals to fractions. • Calculate percentage and convert fractions to percentages. • Calculate circle area and circumference and rectangle area and perimeter. • Explain and apply formulas used regularly in the electrical industry including Ohm's law and the basic power formula.	**Written** • Assignment on Ohm's Law, Watt's Law, Mathematical Formulas and Electrical Mathematical Formulas • Quizzes and Tests • Written Exam on Mathematical Fundamentals (Given pre and post to check students' math levels.) • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practice** CRP 2,4,8 **Cluster Standards** AC 1 **Pathway Standards** AC-CST 5,8,9 AC-DES 8 AC-MO 3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7 **Math** 5.NBT.B.7 4.NFC.5 4.NFC.6 5.NFA.1 5.NFA.2 5.NFB.3 5.NFB.4 5.NFB.6 5.NFB.7 6.RPA.3C 7.RPA.3 7.G.B.4

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
					6.G.A.1 6.EE.A.2.C A.CED.A.4
Weeks 21-30 **Power Tools and Safety**	• What power tools are used in the electrical trades? • Where is information on the safe use of power tools found? • What are the basic safety procedures for using power tools? • Why is it important to use the correct tool for the application? • What should be done with damaged or broken power tools?	• Identify various power tools and their uses for cutting and drilling. • Identify where to find safety information for power tools. • Select essential power tools for residential wiring. • Use electrical power tools safely and efficiently. • Explain procedures for damaged or broken tools.	**Written** • Assignment on Quality of Tools • Quizzes and Tests • Written Exam on Power Tools and Safety Procedures • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Power Tools and Safety Procedures (Both written and practical assessments must be passed before student can go into work stations.)	**Career Ready Practice** CRP 1,2,3,4,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 8 AC-MO 1,2,3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4 **Math**
Weeks 31-35 **Hand Tools and Safety**	• What hand tools are used in the electrical trades? • What is the most important thing to look for when purchasing electrical hand tools? • What are the basic safety procedures for using hand tools?	• Identify basic electrical hand tools and their uses for measuring and working with wire and conduit. • Identify considerations of quality and function when purchasing electrical hand tools. • Select essential hand tools for residential wiring. • Use hand tools safely and efficiently.	**Written** • Assignment on Quality of Tools • Quizzes and Tests • Written Exam on Hand Tools and Safety Procedures • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Hand Tools and Safety Procedures (Both written and practical assessments must be passed before student can go into work stations.)	**Career Ready Practice** CRP 1,2,3,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 8 AC-MO 1,2,3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7 **Math**
Weeks 35-39 **Electrical Materials:**	• What types of materials are used in residential and commercial wiring?	• Identify the types of materials used in residential and commercial wiring. • Describe the differences between	**Written** • Assignments • Quizzes	**Career Ready Practice** CRP 1,2,8	**ELA** 9-10R 9-10W 9-10SL

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Identification and Uses	• What is the National Electrical Code (NEC)?	residential and commercial electrical materials. • List the different conductor systems used in residential and light commercial wiring. • Identify different types of raceway systems. • Describe the different materials used for conductors. • Describe the four types of boxes and box mounting systems. • Describe connectors that fasten wiring to boxes. • List and describe electrical circuit overcurrent protective devices (OCPDs). • Install materials in accordance with the NEC.	• Written Exam on Uses of Electrical Materials • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Identification and Differentiation of Commercial and Residential Materials • Visual Exam on Materials Identification		9-10L
				Cluster Standards AC 1,2,3	**Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7
				Pathway Standards AC-CST 5,7,8,9 AC-DES 4,8 AC-MO 3,4,5	**Math**
Week 40 **Final Examination**	• What knowledge and skills are needed to pass the final exam?	• Review for written final • Practice for hands-on assessment of core electrical tasks on safety and construction	**Written** • Cumulative Final Exam • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Cumulative Practical Assessment	**Career Ready Practice** CRP 1,2,4,8	**ELA** 9-10R 9-10W 9-10SL 9-10L
				Cluster Standards AC 1,2,3,6	**Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7
				Pathway Standards AC-CST 3,4,5,7,8,9 AC-DES 2,4,8 AC-MO 1,2,3,4,5	**Math**

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Syracuse City School District
Career and Technical Education Program
Course Syllabus
ELT 200: Electrical Trades 200

Program Overview

The Electrical Trades Program is a four-year pathway designed to teach students the fundamentals of electricity theory, wiring methods and materials, national and local electrical codes, and print layout, the use of tools and electrical test equipment, the basics of electrical wiring and electrical construction according to the National Electric Code, OSHA 10 Construction Safety certification, and career ready workplace skills. Successful students will have the necessary experience to install receptacles, switches, lighting, and service entrance conductors and work with motors, generators and meters. In the classroom, students will learn both basic electrical theory and get practical hands-on experience, including completing a work-based internship in a local business. Throughout the program students will work both individually and as part of a team to complete assignments and projects. Safety will be given the highest priority at all times as students are working in the classroom. Upon successful completion of the Electrical Trades Program students will be able to obtain entry-level jobs in residential and commercial wiring. Students will also be prepared to continue training and education through post-secondary electrical technology programs at the college level or through private or electrical union apprenticeship programs.

Course Description

Electrical Trades 200 builds on skills learned in Electrical Trades 100 and gives students a more in-depth understanding of the knowledge and skills required to be successful in the electrical industry. This class is a pre-requisite for Electrical Trades 300. Students will build their knowledge and skills in wiring methods and materials, national and local electrical codes, and the proper tools for residential wiring. The course also includes job seeking and communication skills, and an introduction to important professional organizations. Throughout the course there is an emphasis on workplace safety.

Pre-Requisites

ELT 100: Electrical Trades 100

Course Objectives

1. Students will understand the job seeking and communication skills needed to enter the electrical field.
2. Students will understand the importance of workplace safety when working with electricity.
3. Students will learn the safe and efficient use of hand and power tools used in the electrical industry.
4. Students will have knowledge of electrical materials and their purposes for residential wiring.
5. Students will understand electrical theory and mathematics and be able to read electrical prints and schematics.

Integrated Academics

N/A

Equipment and Supplies

- **School will provide:** Complete set of electrical hand tools, power tools, and personal protective equipment.
- **Student will provide:** Work boots or safety shoes

Textbook

Holzman, Harvey N. *Modern Residential Wiring, 11th Edition*. Tinley Park, IL: Goodheart-Willcox Company, Inc., 2018.

Grading

20% Quizzes/Projects
10% Homework
50% Weekly Participation
20% Tests

Additional Course Policies

Student attendance is very important due to the mandatory hours required for licensing, so the absentee policy is strictly enforced.

Course Calendar

Quarter	Units of Study

1	• Electrical Fundamentals:
	  o Shop Safety
	  o Power and Specialized Tools
	  o Career and Communication Skills
	  o Professional Organizations
	• Electrical Energy Fundamentals

2	• Understanding Basic Blueprints
	• Installation of Switch and Receptacle Boxes
	• Residential Electrical Installation:
	  o Wiring Systems
	  o Raceways

3	• Residential Electrical Installation:
	  o Conductors
	  o Box Installation
	  o Fastening Devices
	  o Device Wiring

4	• Residential Electrical Service and Distribution Theory
	• Residential Electrical Installation:
	  o Service Entrance
	  o Load Centers
	  o Transformers
	  o Overcurrent Protection
	  o Grounding
	• Review and Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
ELT 200: Electrical Trades 200

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-4 **Electrical Fundamentals:** • **Shop Safety** • **OSHA 10 Construction Course Instruction** • **Power and Specialized Tools** • **Career and Communication Skills** • **Professional Organizations**	• Why is safety important in the electrical industry? • What power tools are used in the electrical trades? • What skills are needed to obtain a job in the electrical industry? • What professional organizations set standards for the electrical industry?	• List basic shop safety rules. • Maintain safety practices and procedures during electrical installations. • Describe principles of safe tool use and maintenance. • Describe tools used for both essential and more specialized electrical installations including tools for making electrical measurements. • Explain the skills need to both obtain and retain jobs in the electrical industry. • Explore job titles related to electrical careers. • Describe training and licensing requirements for electricians. • Identify professional organizations in the electrical industry.	**Written** • Assignments • Mock Interview Project • Research Project on Five Sources of Energy • Quizzes and Tests • OSHA 10 Formative Assessments • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,3,4,8,10 **Cluster Standards** AC 1,3,4,5,7 **Pathway Standards** AC-CST 5,9 AC-DES 2,4 AC-MO 1,2,3,4	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math**
Weeks 5-10 **Electrical Energy Fundamentals**	• How is electricity measured? • What is the difference between direct and alternating current? • What algebraic equations are needed to complete electrical tasks? • What is Ohm's Law? • What is Watt's Law? • What is a series circuit? • What is a parallel circuit?	• Explain the electron theory for current. • Define and explain the difference between direct current and alternating current. • Define basic electrical terms for measuring electricity including ampere, volt, ohm, watt, joule and kilowatt-hour. • Apply mathematical formulas used regularly in the electrical industry including Ohm's Law and Watt's Law (basic power formula). • Describe the makeup of series and parallel electrical circuits.	**Written** • Assignments • Quizzes and Tests on Specific Areas of Electrical Theory • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Electro-Motive Force (EMF)	**Career Ready Practice** CRP 2,4,8 **Cluster Standards** AC 1 **Pathway Standards** AC-CST 5,8,9 AC-DES 8 AC-MO 1	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math** 6.EE.A.2.C A.CED.4
Weeks 11-16 **Print Reading and Specifications** **Installation of Switch and Receptacle Boxes**	• What do prints represent? • What components of prints are the most important? • When using electrical prints what is the importance of the scale and legend? • What is the proper procedure for installing switch and receptacle boxes?	• Identify the types of prints that an electrician may read. • List the standard parts of drawings and prints. • Interpret a set of prints accurately • Identify and use standard electrical symbols. • Describe the schedules that are found on prints. • Describe the two types of notes.	**Written** • Daily Assignments • Research Project On • Quiz and Tests • Exam on Print Specifications and Codes • Portfolio Update • Self-Assessment **Performance** • Safety Checklist	**Career Ready Practice** CRP 1,2,4,8 **Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 4,7,8	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,7 **Math**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Read an electrical print. • Identify specifications and explain their importance. • Explain where to find codes and authorities for an installation. • Explain the proper procedure for installing switch and receptacle boxes. • Use a print to correctly install a switch and receptacle.	• Procedure Checklist • Teacher Observation Checklist • Practical Exam on Print Reading	AC-MO 1,3	
Weeks 17-23 **Residential Electrical Installation:** • **Wiring Systems** • **Raceways** • **Conductors**	• What is the National Electric Code (NEC)? • What are the components of a wiring system? • What kinds of cables are used in residential wiring? • What the basic ways of bending conduit? • What different materials are used for conductors? • How is the correct conductor size determined?	• Explain where to find appropriate codes and authorities for electrical installation including the NEC. • Describe the different wiring systems and cables used in residential wiring. • Choose appropriate cable products for various installations. • Prepare standard types of cable for connection to device. • Describe different types of raceway materials. • Explain the distinct uses of different types of raceways, based on the NEC. • Cut, prepare, and join various types of raceway materials. • Demonstrate the basics of conduit bending. • List the NEC rules regarding conductors for general wiring. • Describe the different materials used for conductors. • Use the NEC to select a wire type when given a specific installation. • Determine the correct conductor size based on the circuit load using the NEC. • Properly specify wire size using the American Wire Gage (AWG) or kcmils. • Explain the cause of voltage drop. • Compute voltage drop. • List the factors that affect conductor ampacity rating. • Use the NEC to adjust conductor ampacity based on ambient temperature and number of conductors. • Prepare conductors for connection and make safe conductor splices. • Demonstrate the proper method for attaching conductors to devices and fixtures.	**Written** • Daily Assignments • Quizzes and Tests • Written Exam on Raceways, Conductors, And Residential and Commercial NEC Codes • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practice** CRP 1,2,3,4,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 4,8 AC-MO 1,3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math**
Weeks 24-30	• What types of boxes are used	• Identify the four common box shapes.	**Written**	**Career Ready Practice**	**ELA**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Residential Electrical Installation: • **Box Installation** • **Fastening Devices** • **Device Wiring**	in residential wiring? • What are knockouts and pryouts? • What are the different types of fasteners used for box installation and device wiring? • How are conductors prepared, sliced and attached to devices and fixtures?	• List four common box types and explain their uses. • Describe how to use knockouts and pryouts and how to gang boxes. • Demonstrate how to use different types of fasteners in box installation including clamps, ground clips, connectors, bushings, locknuts, couplings and holding devices. • Discuss box mounting systems and box fittings. • Explain and calculate box fill allotment. • Discuss covers for different boxes and applications. • Discuss the significance of listing or labeling electrical devices and materials. • Properly prepare conductors for connection to devices and equipment. • Make safe, secure conductor splices. • Demonstrate the proper method for attaching conductors to switches and receptacles. • Ground a receptacle. • Split-wire a receptacle.	• Daily Assignments • Quizzes • Written Exam on Reading of Simple Electrical Diagrams • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Proper Sizing and NEC Requirements	CRP 1,2,4,8 **Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 4,8 AC-MO 1,3	9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math** 3.OA.D.8 3.OA.D.9
Weeks 31-35 **Residential Electrical Service and Distribution Theory** **Residential Electrical Installation:** • **Service Entrance** • **Load Centers** • **Transformers**	• What is the importance of Ohm's and Watt's Laws? • How do Ohm's and Watt's Laws relate to NEC tables? • What are the components of an electrical circuit? • What is the service entrance? • What are the guidelines when locating the service entrance? • What is the function of the load center? • What is the function of a transformer?	• Explain the formulas in Ohm's and Watt's Laws, how and when to apply them and their relationship to NEC tables. • Perform calculations on an electrical circuit using Ohm's and Watt's Laws. • Break down an electrical circuit into its components. • List the components of the service entrance. • Describe the guidelines for locating the service entrance. • Calculate the size of service entrance needed based on the power needs of the dwelling. • Calculate branch-circuit loads. • Determine the number of branch circuits for a house. • Explain the function of the load center. • Explain noncoincident loads. • Calculate feeder and service loads using two different methods. • Understand the basic requirements for switches, receptacles, and lighting.	**Written** • Assignments • Research Project on Theory of Service Distribution • Test on Load Distribution • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Installation of 120v/240v Electrical Service According to Load Calculation and Syracuse City and NEC Codes (Students will be graded on competency and efficiency of installation.)	**Career Ready Practice** CRP 1,2,4,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 4,8 AC-MO 1,3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math** 3.OA.D.8 3.OA.D.9 A.CED.A.4 A.SSE.A.1.A

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Demonstrate proper installation of service entrance components including conductors between the meter socket, main disconnect, and load center. • Explain the purpose of transformer and where it is used. • Compare and contrast step-up and step-down transformers.			
Weeks 36-39 **Residential Electrical Installation:** • **Overcurrent Protection** • **Grounding**	• What causes overcurrent in electrical circuits? • What are electrical current overcurrent protective devices (OCPDs)? • What are two types of grounding for electrical systems? • What is bonding? • What are two types of circuit interrupters?	• Explain the causes of overcurrent. • List and describe electrical circuit OCPDs. • Describe the rating system for OCPDs. • Explain the operation of a ground-fault circuit interrupter (GFCI) and where it is used. • Explain how an arc-fault circuit interrupter (AFCI) works and the hazards it is designed to prevent. • Explain which branch circuits require an AFCI. • Explain the working principles for electrical grounding. • Describe system grounding and equipment grounding and their purposes. • Define bonding and explain how it is done.	**Written** • Daily Assignments • Quizzes and Tests • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Exam on Identification of Different OCPDS and Their Uses • Practical Exam on Scenarios with Different Types of Grounding, Bonding, Fusing, and Sizing	**Career Ready Practice** CRP 1,2,4,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 4,8 AC-MO 1,3	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math**
Week 39-40 **Review and Final Examination**	• What knowledge and skills are needed to pass the final exam?	• Review for written final. • Practice for hands-on assessment of core electrical tasks on installation and design.	**Written** • Cumulative Final Exam • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Cumulative Practical Assessment of Skills	**Career Ready Practice** CRP 1,2,4,8,11 **Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 3,4,5,7,8,9 AC-DES 2,4,7,8 AC-MO 1,2,3,4	**ELA** 9-10R 9-10W 9-10SL 9-10L **Literacy** 9-10RST 1,3,4,7 9-10WHST 2,4,9 **Math**

Return to TOC

Syracuse City School District
Career and Technical Education Program
Course Syllabus
ELT 300: Electrical Trades 300

Program Overview

The Electrical Trades Program is a four-year pathway designed to teach students the fundamentals of electricity theory, wiring methods and materials, national and local electrical codes, and print layout, the use of tools and electrical test equipment, the basics of electrical wiring and electrical construction according to the National Electric Code, OSHA 10 Construction Safety certification, and career ready workplace skills. Successful students will have the necessary experience to install receptacles, switches, lighting, and service entrance conductors and work with motors, generators and meters. In the classroom, students will learn both basic electrical theory and get practical hands-on experience, including completing a work-based internship in a local business. Throughout the program students will work both individually and as part of a team to complete assignments and projects. Safety will be given the highest priority at all times as students are working in the classroom. Upon successful completion of the Electrical Trades Program students will be able to obtain entry-level jobs in residential and commercial wiring. Students will also be prepared to continue training and education through post-secondary electrical technology programs at the college level or through private or electrical union apprenticeship programs.

Course Description

At this level, students will go into depth with the fundamentals of basic wiring established in ELT 200, including knowledge of the NEC for proper wiring, devicing, materials, and installation. Students will understand the what, how, and why of residential wiring as well as the proper procedure for making a residential wiring project efficient. Students will continue to build their understanding of Ohm's Law, Watt's Law and the NEC Code Book. They will know and apply the terminology and symbols on electrical prints as well as the proper tools and equipment needed for different installation tasks. Students who successfully complete ELT 300 will have the skills comparable to those required for an entry-level job in residential wiring.

Pre-Requisites

ELT 100: Electrical Trades 100
ELT 200: Electrical Trades 200

Course Objectives

1. Students will know the safety standards for OSHA 10 Construction Safety.
2. Students will know electrical theory and fundamentals.
3. Students will know the difference between residential and commercial wiring.
4. Students will understand electrical metering devices.
5. Students will know the proper identification and safe use of electrical hand and power tools.

Integrated Academics

1 CTE Integrated Math Credit

Equipment and Supplies

- **School will provide:** Complete set of electrical hand tools, power tools, and personal protective equipment.
- **Student will provide:** work boots or safety shoes

Textbook

Holzman, H. N. (2018). *Modern Residential Wiring, 11th Edition.* Tinley Park, IL: Goodheart-Willcox Company, Inc.

Grading

20% Quizzes/Projects
10% Homework
25% Weekly Participation
25% Labs
20% Tests and Unit Exams

Additional Course Policies

Student attendance is very important due to the mandatory hours required for the national assessment. The absentee policy is strictly enforced.

Course Calendar

Quarter	Units of Study

1	• Electrical Fundamentals:
	  o Shop Safety
	  o Power and Specialized Tools
	  o Career and Communication Skills
	  o Professional Organizations
	• Electrical Energy and Mathematics Fundamentals

2	• Print Reading, Specifications and Codes
	• Residential Electrical Installation:
	  o Service Entrance
	  o Load Centers
	  o Transformers
	• Residential Electrical Installation: Conductors and Cables

3	• Residential Electrical Installation:
	  o Raceways Systems, Boxes Fittings and Covers,
	  o Device Wiring
	  o Lighting Systems
	  o Appliance Wiring and Special Outlets

4	• Residential Electrical Installation:
	  o Overcurrent Protection
	  o Grounding
	• Residential Electrical Service Design and Installation
	• Review and Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
ELT 300: Electrical Trades 300

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **Electrical Fundamentals:** • **Shop Safety** • **OSHA 10 Construction Course Instruction** • **Power and Specialized Tools** • **Career and Communication Skills** • **Professional Organizations**	• Why is safety important in the electrical industry? • What algebraic equations are needed to complete electrical tasks? • What power tools are used in the electrical trades? • What skills are needed to obtain a job in the electrical industry? • What professional organizations set standards for the electrical industry?	• List basic shop safety rules. • Maintain safety practices and procedures during electrical installations. • Describe principles of safe tool use and maintenance. • Describe tools used for both essential and more specialized electrical installations including tools for making electrical measurements. • Explain the skills need to both obtain and retain jobs in the electrical industry. • Identify professional organizations in the electrical industry.	**Written** • Assignments • Research Project on the Five Sources of Energy • Quizzes on Tools • OSHA 10 Formative Assessments • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Tool Identification Test	**Career Ready Practices** CRP 1,2,3,4,8,10 **Cluster Standards** AC 1,3,4,5,7 **Pathway Standards** AC-CST 5,9 AC-DES 8 AC-MO 1,3	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,9 11-12WHST 2,5,6,7 **Math**
Weeks 4-10 **Electrical Energy and Mathematics Fundamentals**	• How is electricity measured? • What is Ohm's Law? • What is Watt's Law? • What is the difference between direct and alternating current? • What is a series circuit? • What is a parallel circuit?	• Define basic electrical terms for measuring electricity including ampere, volt, ohm, watt, joule and kilowatt-hour. • Apply mathematical formulas used regularly in the electrical industry including Ohm's Law and Watt's Law (basic power formula). • Explain the difference between direct current and alternating current. • Describe the makeup of series and parallel electrical circuits.	**Written** • Assignments • Quizzes and test on specific areas of electrical theory • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practice** CRP 2,4,8 **Cluster Standards** AC 1 **Pathway Standards** AC-CST 5,8,9 AC-DES 8 AC-MO 1	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7 **Math** A.CED.A.4 6.EE.A.2.C N.Q.A.1 N.Q.A.2 N.Q.A.3
Weeks 11-16 **Print Reading, Specifications and Codes** **Residential Electrical Installation:** • **Service Entrance** • **Load Centers** • **Transformers**	• What do prints represent? • What components of prints are the most important? • When using electrical prints what is the importance of the scale and legend? • What is the service entrance? • What are the guidelines when locating the service entrance? • What is the function of the load center? • What is the function of a transformer?	• Identify the types of prints that an electrician may read. • List the standard parts of a drawing. • Identify and use standard electrical symbols. • Describe the schedules that are found on prints. • Describe the two types of notes. • Read an electrical print. • Identify specifications and explain their importance. • Explain where to find codes and authorities for an installation.	**Written** • Assignments • Quiz and Tests • Written exams on proper sizing, efficiency, material handling, and timing • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practice** CRP 1,2,4,8 **Cluster Standards** AC 1,2,3 **Pathway Standards** AC-CST 5,7,8,9 AC-DES 2,7,8 AC-MO 1,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7 **Math**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
		• Identify the marks of the most commonly used testing agencies. • List the components of the service entrance. • Describe the guidelines for locating the service entrance. • Calculate the size of service entrance needed based on the power needs of the dwelling. • Explain the function of the load center. • Demonstrate proper installation of service entrance components including conductors between the meter socket, main disconnect, and load center. • Explain the purpose of transformer and where it is used. • Compare and contrast step-up and step-down transformers.	• Practical Assessment on Print Reading • Practical Assessment of Proper Sizing, Efficiency, Material Handling, And Timing		
Weeks 17-20 **Residential Electrical Installation: Conductors and Cables** **Participation in Regional Skills USA Competition**	• What is the National Electric Code (NEC)? • What different materials are used for conductors? • How is the correct conductor size determined? • What are the components of a wiring system? • What kinds of cables are used in residential wiring?	• List the NEC rules regarding conductors for general wiring. • Describe the different materials used for conductors. • Use the NEC to select a wire type when given a specific installation. • Properly specify wire size using the American Wire Gage (AWG) or kcmils. • Explain the cause of voltage drop. • Compute voltage drop. • List the factors that affect conductor ampacity rating. • Determine the correct conductor size based on the circuit load using the NEC. • Use the NEC to adjust conductor ampacity based on ambient temperature and number of conductors. • Demonstrate the proper method for attaching conductors to devices and fixtures. • Describe the different wiring systems and cables used in residential wiring. • Choose appropriate cable products for various installations. • Prepare standard types of cable for connection to device.	**Written** • Assignments • Quizzes and Tests • Written Assessment on Identifying Proper Conductors According Ampacity • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Conductor Sizing According to Given Ampacity • Skills USA Competition	**Career Ready Practices** CRP 1,2,4,6,8,12 **Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 4,8 AC-MO 1,3	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7 **Math** N.Q.A.1 N.Q.A.2 N.Q.A.3
Weeks 21-24 **Residential Electrical Installation:**	• What the basic ways of bending conduit? • What types of boxes are used in residential wiring?	• Describe different types of raceway materials. • Explain the distinct uses of different types of raceways, based on the NEC.	**Written** • Assignments • Research Project on Materials	**Career Ready Practices** CRP 1,2,4,8,7,12	**ELA** 11-12R 11-12W 11-12SL 11-12L

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Raceways Systems, Boxes Fittings and Covers,	• What are knockouts and pryouts? • What are the different types of fasteners used for box installation and device wiring?	• Cut, prepare, and join various types of raceway materials. • Demonstrate the basics of conduit bending. • Identify the four common box shapes. • List four common box types and explain their uses. • Describe how to use knockouts and pryouts and how to gang boxes. • Demonstrate how to use different types of fasteners in box installation including clamps, ground clips, connectors, bushings, locknuts, couplings and holding devices. • Discuss box mounting systems and box fittings. • Explain and calculate box fill allotment. • Discuss covers for different boxes and applications.	• Quiz and Tests • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Identification and Installation of Materials	**Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 4,8 AC-MO 1,3	**Literacy** 11-12RST 1,2,4,9 11-12WHST 2,5,6,7 **Math** 7.EE.B.3
Weeks 25-27 **Residential Electrical Installation: Device Wiring Lighting Systems**	• How are conductors prepared, sliced and attached to devices and fixtures? • What are the main types of lighting in a home? • Why are different types of lighting fixtures and lighting technologies used in a residential installation?	• Discuss the significance of listing or labeling electrical devices and materials. • Properly prepare conductors for connection to devices and equipment. • Make safe, secure conductor splices. • Demonstrate the proper method for attaching conductors to switches and receptacles. • Ground a receptacle. • Split-wire a receptacle. • Define basic lighting terminology. • Explain the main types of lighting in a home. • Identify various lighting fixtures. • Select lighting fixtures for specific applications. • Compare lamp types and lighting technologies. • Identify various light switches • Make wiring connections for common lighting circuits	**Written** • Assignments • Quiz and Tests • Written Assessment with Visual Aids on Identification of Devices • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Proper Installation of Residential devices and lighting systems	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 8 AC-MO 1,3	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7 **Math**
Weeks 28-30 **Residential Electrical Installation: Appliance Wiring and Special Outlets**	• What are the main concerns when installing appliances? • What are the electrical requirements of common household appliances? • What NEC regulations pertain to appliance circuits and other	• Describe NEC regulations for appliance circuits and other special circuits. • Describe installation practices for various appliances and special circuits. • Describe various methods of heating. • Explain basic electrical requirements of many common household appliances.	**Written** • Assignments • Quizzes • Portfolio Update • Self-Assessment **Performance** • Safety Checklist	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,2,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	special circuits?		• Procedure Checklist • Teacher Observation Checklist • Practical Assessment of Wiring Dryers, Hot Water Tanks and Stoves	**Pathway Standards** AC-CST 5,8,9 AC-DES 4,8 AC-MO 1,3	**Math**
Weeks 31-34 **Residential Electrical Installation:** • **Overcurrent Protection** • **Grounding**	• What causes overcurrent in electrical circuits? • What are electrical current overcurrent protective devices (OCPDs)? • What are two types of grounding for electrical systems? • What is bonding? • What are two types of circuit interrupters?	• Explain the causes of overcurrent. • List and describe electrical circuit OCPDs. • Describe the rating system for OCPDs. • Explain the operation of a ground-fault circuit interrupter (GFCI) and where it is used. • Explain how an arc-fault circuit interrupter (AFCI) works and the hazards it is designed to prevent. • Explain which branch circuits require an AFCI. • Explain the working principles for electrical grounding. • Describe system grounding and equipment grounding and their purposes. • Define bonding and explain how it is done.	**Written** • Assignments • Research Project on History of Fuses and Breakers • Quizzes and Tests • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Use of Metering Devices to Determine Breaker Size, Fuse Size and other Overcurrent Protection Devices Needed	**Career Ready Practices** CRP 1,2,4,7,8,12	**ELA** 11-12R 11-12W 11-12SL 11-12L
				Cluster Standards AC 1,2,3,6	**Literacy** 11-12RST 1,2,4,9 11-12WHST 2,5,6,7
				Pathway Standards AC-CST 5,8,9 AC-DES 4,8 AC-MO 1,3	**Math** 7.EE.B.3
Weeks 35-38 **Residential Electrical Service Design and Installation**	• What is electrical service? • How do you calculate the size of electrical service? • What are the differences between overhead and underground services per NEC?	• Explain what materials are used for different types of electrical services • Calculate the size of electrical service • Explain the differences between overhead and underground services • Lay out and install a residential electrical service per blueprint, NEC, and Authority Having Jurisdiction (AHJ)	**Written** • Assignments • Quizzes and Tests • Portfolio Update • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Installation of Electrical Service as per Given Specifications	**Career Ready Practice** CRP 1,2,4,8,12	**ELA** 11-12R 11-12W 11-12SL 11-12L
				Cluster Standards AC 1,2,3,6	**Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7
				Pathway Standards AC-CST 3,4,5,7,8,9 AC-DES 4,8 AC-MO 1,3	**Math**
Week 39-40 **Review and Final Examination**	• What knowledge and skills are needed to pass the final exam?	• Review for written final • Practice for hands-on assessment of core electrical tasks on safety and construction	**Written** • Cumulative Final Exam • Portfolio Update • Self-Assessment **Performance** • Cumulative Practical Assessment	**Career Ready Practice** CRP 1,2,4,8	**ELA** 11-12R 11-12W 11-12SL 11-12L
				Cluster Standards AC 1,2,3,6	**Literacy** 11-12RST 1,2,4,7 11-12WHST 2,6,7
				Pathway Standards AC-CST 3,4,5,7,8,9	**Math**

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
				AC-DES 4,7,8 AC-MO 1,3,6	

Return to TOC

Syracuse City School District
Career and Technical Education Program
Course Syllabus
ELT 400: Electrical Trades 400

Program Overview

The Electrical Trades Program is a four-year pathway designed to teach students the fundamentals of electricity theory, wiring methods and materials, national and local electrical codes, and print layout, the use of tools and electrical test equipment, the basics of electrical wiring and electrical construction according to the National Electric Code, OSHA 10 Construction Safety certification, and career ready workplace skills. Successful students will have the necessary experience to install receptacles, switches, lighting, and service entrance conductors and work with motors, generators and meters. In the classroom, students will learn both basic electrical theory and get practical hands-on experience, including completing a work-based internship in a local business. Throughout the program students will work both individually and as part of a team to complete assignments and projects. Safety will be given the highest priority at all times as students are working in the classroom. Upon successful completion of the Electrical Trades Program students will be able to obtain entry-level jobs in residential and commercial wiring. Students will also be prepared to continue training and education through post-secondary electrical technology programs at the college level or through private or electrical union apprenticeship programs.

Course Description

This course is designed to educate students in the commercial aspect of the electrical industry. Students will expand on their knowledge of electrical theory and application learned in Electrical Trades 100, 200 and 300. Students will interpret blueprints and specifications appropriate to a commercial setting, and identify the different materials and tools needed for the installation of commercial wiring. As a requirement for the course, students will complete internships with local electrical contractors, complete a professional portfolio and take a national assessment to earn CTE endorsement for graduation. Students who successfully complete ELT 400 are eligible to take the entrance exam for the IBEW (International Brotherhood of Electrical Workers) training program. Those students who pass the entrance exam will be interviewed for admittance to the program and will be on their way to a successful career in the electrical industry.

Pre-Requisites

ELT 100: Electrical Trades 100
ELT 200: Electrical Trades 200
ELT 300: Electrical Trades 300

Course Objectives

Students will:

- Gain essential employability skills.
- Obtain OSHA 10 certification.
- Understand electrical theory in a commercial setting.
- Know how to navigate through the NEC.
- Gain experience with motor control.
- Understand different types of transformers and ratings.
- Understand NEMA ratings for different commercial materials.
- Complete a professional portfolio.
- Pass a national assessment of knowledge and skills in Electrical trades.

Integrated Academics

1 CTE Integrated English Credit

Equipment and Supplies

- **School will provide:** Complete set of electrical hand tools, power tools, and personal protective equipment.
- **Student will provide:** work boots or safety shoes

Textbook

Holzman, H. N. (2018). *Modern Commercial Wiring, 7th Edition.* Tinley Park, IL: Goodheart-Willcox Company, Inc.

Grading

20% Quizzes/Projects
10% Homework
25% Weekly Participation
25% Labs
20% Tests and Unit Exams

Additional Course Policies

Student attendance is very important due to the mandatory hours required for the national assessment. The absentee policy is strictly enforced.

Course Calendar

Quarter	Units of Study

1	• Electrical Fundamentals:
	  ○ Shop Safety
	  ○ Power and Specialized Tools
	  ○ Career and Communication Skills
	  ○ Professional Organizations
	• Commercial Electrical Print Specifications and Codes
	• Specialized Industrial Wiring Methods
	• Commercial Materials: Boxes and Conduit Bodies

2	• Commercial Electrical Installation:
	  ○ Overcurrent Protection
	  ○ Service Distribution
	  ○ Transformers
	  ○ Branch Circuits and Feeders

3	• Commercial Electrical Installation: Electrical Motors Installation, Troubleshooting and Repair • Specialized Commercial Installations
4	• Alternative Energy Sources • Internships • Review of All Electrical Construction, Maintenance and Repair • Pre-Employment Exam for IBEW • Review and Final Examination

Syracuse City School District
Career and Technical Education Program
Scope and Sequence
ELT 400: Electrical Trades 400

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Weeks 1-3 **Electrical Fundamentals:** • **Shop Safety** • **OSHA 10 Construction Certification** • **Power and Specialized Tools** • **Career and Communication Skills** • **Professional Organizations**	• Why is safety important in the electrical industry? • What algebraic equations are needed to complete electrical tasks? • What power tools are used in the electrical trades? • What skills are needed to obtain a job in the electrical industry? • What professional organizations set standards for the electrical industry?	• List basic shop safety rules. • Maintain safety practices and procedures during electrical installations. • Describe principles of safe tool use and maintenance. • Describe tools used for both essential and more specialized electrical installations including tools for making electrical measurements. • Explain the skills need to both obtain and retain jobs in the electrical industry. • Identify professional organizations in the electrical industry.	**Written** • Assignments • Research Project on the Five Sources of Energy • Quizzes and Tests • OSHA 10 Construction Certification Summative Assessment • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Tool Identification Test	**Career Ready Practices** CRP 1,2,4,8,10,12 **Cluster Standards** AC 1,3,4,7 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,5,6,7 **Math**
Weeks 4-5 **Commercial Electrical Print Specifications and Codes**	• What is the importance of electrical drawings and prints? • What is the purpose of the National Electric Code (NEC)? • What agencies set standards for electrical practices and procedures? • What safety and performance testing is performed on electrical devices, equipment and components?	• Describe several types of electrical drawings. • Identify common electrical symbols. • Explain the purpose of specifications. • Explain the importance of building codes. • Define the purpose, intent, arrangement, and key terminology of the NEC. • Name various agencies that set standards concerning electrical practices and procedures. • Identify various lab facilities that perform rigorous testing on electrical devices, equipment, and associated components for safety and performance certification.	**Written** • Assignments • Quizzes and Tests • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Design of Legend, Keys and Symbols for Specific Prints	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,7,8 AC-MO 1,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math**
Weeks 5-8 **Specialized Industrial Wiring Methods**	• What wiring methods are available for commercial installations? • What are the rules for commercial wiring methods? • What are the important components of each wiring method? • What is the purpose of the different types of wiring	• List the wiring methods available for commercial installation and the rules regarding each method of wiring. • Size wireways to satisfy Code requirements. • Identify fittings, connectors, supports, and other integral hardware unique to a particular wiring method. • Select the correct wiring method based on Code requirements.	**Written** • Assignments • Quiz and Tests • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math** 2.MD.A.1

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
	hardware? • What are the Code requirements for different wiring methods?	• Calculate wireway size.	Identifying Industrial Materials, Bending EMT, Rigid and PVC Conduit	AC-DES 2,4,8 AC-MO 1,3,6	7.EE.B.3
Weeks 9-10 **Commercial Materials: Boxes and Conduit Bodies/Condulets**	• What is the purpose of different types of boxes and conduit bodies/condulets? • How are materials selected for various types of applications? • What are the Code requirements for different types of boxes and conduit bodies/condulets?	• Identify different types of boxes. • Select boxes for various applications. • Explain how boxes are grounded. • Mount and support boxes in accordance with the Code. • Identify various types of conduit bodies. • Perform box fill calculations using the Code. • Compute box sizes for straight and angular pulls.	**Written** • Assignments • Quiz and Tests • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Installation of Condulets	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math** 7.EE.B.3
Weeks 11-14 **Commercial Electrical Installation:** • **Overcurrent Protection** • **Service Distribution** • **Transformers**	• What are the characteristics of different types of electrical protective devices? • What is the difference between fuses and circuit breakers? • What are the common applications of various supply voltages available in the United States? • What is the purpose and uses of transformers?	• Identify the types, ratings, and characteristics of electrical protective devices. • Recognize overloads and short circuits. • List types of fuses. • Compare fuses and circuit breakers. • Describe the two basic types of service. • Explain service terminology. • Find service drop clearance in the Code. • Compare the arrangement and construction of service drops and service laterals. • Identify the required working clearances at the service equipment. • Explain the various supply voltages available in the United States and their common applications. • Define the purpose and uses of transformers. • Identify the basic components and construction of a transformer. • Explain how a transformer works. • List the types of transformers. • Size overcurrent protective devices for transformer primaries and secondaries. • Perform transformer calculations and solve practical transformer problems.	**Written** • Assignments • Quizzes and Tests • Written Assessment on Proper Sizing of Transformer and Overcurrent Protection • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on proper Installation of Transformer and Overcurrent Protection	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math** 2.MD.A.1 7.RP.A.3
Weeks 15-20 **Commercial Electrical**	• What are the components of a distribution system? • What are the various types of branch circuits?	• Identify the feeder and branch circuit portions of a distribution system. • Describe the various types of branch circuits.	**Written** • Assignments • Quizzes and Tests • Self-Assessment	**Career Ready Practices** CRP 1,2,4,8,12	**ELA** 11-12R 11-12W 11-12SL 11-12L

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Installation: Branch Circuits and Feeders **Participation in Regional Skills USA Competition**	• What are the functions of feeders and branch-circuit conductors? • How are feeder conductors sized?	• Define the functions of a feeder and the functions of branch-circuit conductors. • Calculate lighting and receptacle loads using Code requirements. • Size branch circuits in accordance with the Code. • Determine branch circuit overcurrent protection required by the Code. • Use the Code to size feeder conductors.	**Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Identifying Proper Branch Feeders and Wire for Project • Skills USA Competition	**Cluster Standards** AC 1,2,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,3,6	**Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math** 2.MD.A.1 7.EE.B.3
Weeks 21-28 **Commercial Electrical Installation: Electrical Motors Installation, Troubleshooting and Repair**	• What are the basic classes and components of motors? • What is the difference between true power, apparent power, and power factor? • What is the difference between manual and magnetic starters? • How is the proper overcurrent protection and conductor sizes for a control circuit determined?	• Explain the basic components of motors. • List various classes of motors. • Calculate motor starting currents. • Use the Code to design motor branch circuits, including overcurrent protection. • Define and compute true power, apparent power, and power factor. • List Code requirements for motor controls and motor control circuits. • Determine the proper overcurrent protection and conductor sizes for a control circuit. • Identify several types of pilot devices. • Read control circuit diagrams. • Reverse motor direction by switching connections. • Describe basic motor control center setup.	**Written** • Assignments • Quizzes and Tests • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist • Practical Assessment on Proper Sizing, Rotation, and Installation of Motors	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,2,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math** 7.EE.B.3 A.REI.A.1 A.REI.A.2 A.REI.B.3 A.REI.B.4 2.MD.A.1
Weeks 29-32 **Specialized Commercial Installations** **Alternative Energy Sources**	• What are the requirements of installations around pools and hot tubs? • What are some alternative energy sources in use today? • What are the considerations when installing or troubleshooting alternative energy sources?	• Describe the requirements for receptacles and luminaire placement around pools. • Describe various types of underwater luminaire. • Identify limitations and clearances for conductors passing over pools. • List the Code rules for bonding and grounding equipment near a pool. • Identify the Code requirements for spa and hot tub installation. • Describe various alternative energy sources. • Size a generator for a residential system. • Calculate the return on wind turbines.	**Written** • Assignments • Research Project alternative energies used in local area and which are most efficient for local conditions • Test • Self-Assessment **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation Checklist	**Career Ready Practices** CRP 1,2,4,5,8,12 **Cluster Standards** AC 1,3,6 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,5,6,7 **Math** 2.MD.A.1 7.RPA.3
Weeks 33-36 **Internships**	• How preparation is needed for a particular career choice?	• Apply job search techniques to seek out, evaluate and obtain internship	**Written** • Self-Assessment	**Career Ready Practices** CRP 1,2,4,8,10,12	**ELA** 11-12R 11-12W

Time Frame Unit of Study	Key Questions	Key Learning Targets (Students will know and be able to)	Assessment Evidence of Learning	CCTC Standards	NYS Standards
Review of All Electrical Construction, Maintenance and Repair **Pre-Employment Exam for IBEW**	• Why are successful job-seeking skills required in a competitive marketplace? • How does an electrician convey professionalism in the workplace? • Why are internships necessary? • How does an internship experience contribute to a professional portfolio? • What were areas of improvement and challenges during the internship experience? • What were the main learning goals for this past year?	opportunities. • Communicate with industry/potential employers through the internship experience. • Apply knowledge and skills from the classroom to workplace situations. • Explain the importance of professionalism and ethics in the workplace. • Comply with workplace policies and regulations. • Communicate effectively both verbally and in writing with coworkers and customers. • Explain the importance of being prompt, being able to take directions and being motivated to accomplish assigned tasks. • Analyze and resolve problems that arise in completing assigned tasks. • Update online professional portfolio and employability profile. • Review knowledge and skills from the program in preparation for IBEW Pre-Employment Exam, Final Examination and NOCTI Assessment.	• Reflection Summary: Internship Experience • Professional Portfolio • Employability Profile • IBEW Pre-Employment Exam **Performance** • Internship Checklist • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist	 **Cluster Standards** AC 1,3,6,7 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,8 AC-MO 1,3,6	11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math**
Week 39-40 **Review and Final Examination**	• What knowledge and skills are needed to pass the final exam?	• Review for written final. • Practice for hands-on assessment of core electrical tasks on safety and construction.	**Written** • Self-Assessment • Skills USA Written Assessment • Portfolio Completion **Performance** • Safety Checklist • Procedure Checklist • Teacher Observation • Teacher Checklist • Skills USA Performance Assessment	**Career Ready Practices** CRP 1,2,4,8,12 **Cluster Standards** AC 1,2,3,4,6,7 **Pathway Standards** AC-CST 5,8,9 AC-DES 2,4,7,8 AC-MO 1,2,3,6	**ELA** 11-12R 11-12W 11-12SL 11-12L **Literacy** 11-12RST 1,2,4,7,9 11-12WHST 2,6,7 **Math**

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B. Teacher Certification

> *The self-study team reviews the teacher certification and training of the school or BOCES' instructional, paraprofessional, and support staff who deliver services within the CTE program seeking approval. New York State teacher certification review should include both CTE teachers and teachers of academic content within the proposed program.*

Process

- Reviewers confirm that all CTE teachers hold appropriate New York State teacher certification for the program in which they will teach.
- Reviewers confirm that all teachers of academic content hold appropriate New York State teacher certification for the program in which they will teach.
- Reviewers confirm the appropriate NCLB highly-qualified status for the CTE teachers in programs offering academic credit.
- Reviewers confirm that staff delivering instruction in programs where certification, licensure, or registration by an external entity have acquired the necessary credentials.
- Reviewers confirm that professional development opportunities exist within the school district or BOCES for instructional, paraprofessional, and support staff to acquire and improve skills and knowledge related to instructional enhancement of the CTE program.

Documentation

Recommendations from the review of teacher certification should be included in the self-study report and reviewed by the external committee. A list of all teachers for the program and the New York State teacher certification(s) held by each must be attached to the Application for Career and Technical Education Program Approval.

Resources

New York State Office of Teaching Initiatives
http://www.highered.nysed.gov/tcert/certificate/certprocess.htm

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

◉	JAMES	WILSON	SYRACUSE	NY	N/A

Certificate Information for New York State Teaching Certificate Holder

Certificate Title	Issue / Effective Date	Expiration Date	Status
Electrical/Electronic Equipment Occupations (Repair & Installation) 7-12 Transitional A Certificate	11/05/2014	01/31/2021	Issued

Search Results

Select	First Name	Last Name	MI	City	State	Registration Status
◉	SHANE	GUIDO	D	LIVERPOOL	NY	Registered

View Detail

Certificate Information for New York State Teaching Certificate Holder

Certificate Title	Issue / Effective Date	Expiration Date	Status
Students With Disabilities - Grades 7-12 - English Professional Certificate	09/01/2011		Issued
English Language Arts 7-12 Professional Certificate	09/01/2011		Issued
Students With Disabilities - Grades 7-12 - English Initial Certificate	09/01/2006	08/31/2011	Expired
English Language Arts 7-12 Initial Certificate	09/01/2006	08/31/2011	Expired

Search Results

Select	First Name	Last Name	MI	City	State	Registration Status
◉	IAN	LANE	E	SYRACUSE	NY	Registered

View Detail

Certificate Information for New York State Teaching Certificate Holder

Certificate Title	Issue / Effective Date	Expiration Date	Status
Mathematics 7-12 Professional Certificate	09/01/2012		Issued
Mathematics 7-12 Initial Certificate	09/01/2007	08/31/2012	Expired

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C. Technical Assessments Based on Industry Standards

> *The self-study team reviews the selection of a technical assessment for the program seeking approval. The selected technical assessment must be nationally-recognized and based on industry standards. It must be available to students enrolled in the approved program and must consist of three parts: written, student demonstration, and student project. Successful completion of the technical assessment is not a requirement for high school graduation, but is required for a student to earn a technical endorsement on the high school diploma*
>
> *The New York State Education Department does not approve, endorse, or certify any technical assessment.*

Process

- The school district or BOCES selects an appropriate industry standard technical assessment to measure student proficiency in the technical field for the program. The school district or BOCES may select a New York State licensing examination as the technical assessment.
- The school district or BOCES determines the scheduling and administration of technical assessments. It is not required that the technical assessment be administered at the conclusion of the program. Parts may be administered throughout a student's learning experience.
- The school district or BOCES determines the number of times a student may take a particular technical assessment.
- The school district or BOCES must comply with existing laws and regulations related to administration of technical assessments to students with disabling conditions and provide appropriate testing modifications. Restrictions on student eligibility for testing are the responsibility of the test producer.
- In the absence of an appropriate nationally-recognized industry standard based assessment, a consortium of local, regional, state, business and industry representatives may be formed to produce such an instrument.
    - Technical assessments must meet generally recognized psychometric criteria. Therefore, the consortium approach may be expensive because of the many steps required to insure assessment validity, reliability, and security.
    - An existing CTE advisory committee or craft committee is not a technical assessment consortium. The school district or BOCES must ensure that the assessment consortium adequately represents current business and industry standards for the specific career area for the program.
- Where an appropriate technical assessment exists, but consists of only one or two parts, a consortium must be formed to develop the missing part(s).
- The school district or BOCES must develop a system to collect student-level and program-level data on performance on the technical assessment.

Documentation

Recommendations on the technical assessment selection should be included in the self-study report and reviewed by the external committee.

Resources

New York State graduation requirements: http://www.emsc.nysed.gov/part100/pages/1005.html

Information on the Technical Endorsement: http://www.emsc.nysed.gov/cte/ctepolicy/endorsement.html

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

NOCTI®

Job Ready Assessment Blueprint

Electrical Construction Technology

Test Code: 4130 / Version: 01

"Measuring What Matters"

Specific Competencies and Skills Tested in this Assessment:

Introduction to the Electrical Construction Technology Career

- Identify various electrical construction technology positions and responsibilities
- Identify career-related professional organizations and their purpose

OSHA Regulations and Electrical Safety Practices

- Identify proper use of personal protective equipment (PPEs) according to NFPA 70E standards
- Explain the purpose of OSHA
- Identify procedures for fire, ladder, and environmental safety according to OSHA standards (including lock-out/tag-out)

Meters, Measurements, Testing

- Identify characteristics, uses, and connections of meters and measuring devices
- Identify meter safety procedures

Identification and Selection of Tools, Materials, and Components

- Identify and correctly use hand and power tools
- Identify and select proper conductor cable type
- Identify and select proper conduit, boxes, and fittings
- Identify the function and purpose of various specialty equipment, including Ground Fault Circuit Interrupter (GFCI), Arc-Fault Circuit Interrupter (AFCI), Tamper-Resistant, and Transient Voltage Surge Suppressor (TVSS)
- Identify commonly used listed and labeled equipment

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Specific Competencies and Skills continued:

National Electrical Code (NEC)

- Explain NEC and how it is organized
- Explain procedures involved in NEC wiring methods, materials, and protection regulations
- Identify basic service entrance requirements
- Properly apply NEC tables and charts
- Describe proper bonding and grounding methods

Blueprints, Specifications, and Estimations

- Identify and interpret electrical symbols and specifications in blueprints and/or plans
- Identify and interpret wiring and schematic diagrams
- Demonstrate planning and layout of a circuit

AC Theory, Magnetic Theory, and DC Theory

- Identify characteristics of AC circuits
- Explain capacitance, inductance, impedance, current, voltage, and resistance
- Calculate power consumption, dissipation, and loss
- Demonstrate principles of magnetic theory
- Identify materials as insulators, conductors, and semi-conductors
- Identify characteristics and components of DC circuits

Circuit Theorems and Conversions

- Identify and apply various circuit theorems, including Ohm's Law, Kirchoff's Law, Watt's Law, and electron theory
- Interpret meter readings
- Identify and apply various mathematical conversions, including scientific, engineering and metric notations/conversions

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Specific Competencies and Skills continued:

Wiring, Circuits, and Installation

- Select appropriate wiring for specific installations (residential and commercial)
- Install various switching arrangements
- Install cabling, raceways, conduit, boxes, wiring, devices, and trims
- Test and troubleshoot completed installation

Green and Renewable Technology

- Discuss wind turbine, solar energy, and other renewable sources of energy
- Explain the function and characteristics of rectifiers, inverters, and filters
- Describe energy management devices (e.g., LED lighting, CFLs, occupancy sensors)

Transformers

- Identify and calculate voltage/current for primary and secondary windings
- Determine KVA capacity and differentiate between Delta and Wye connections

Motors

- Describe characteristics of various types of motors
- Identify and connect motor connections per nameplate (Delta/Wye and single-phase)
- Test, troubleshoot, and reverse motor rotation
- Select short-circuit and overload protection for specific applications
- Identify and interpret motor nameplate information (e.g., voltage and phases)

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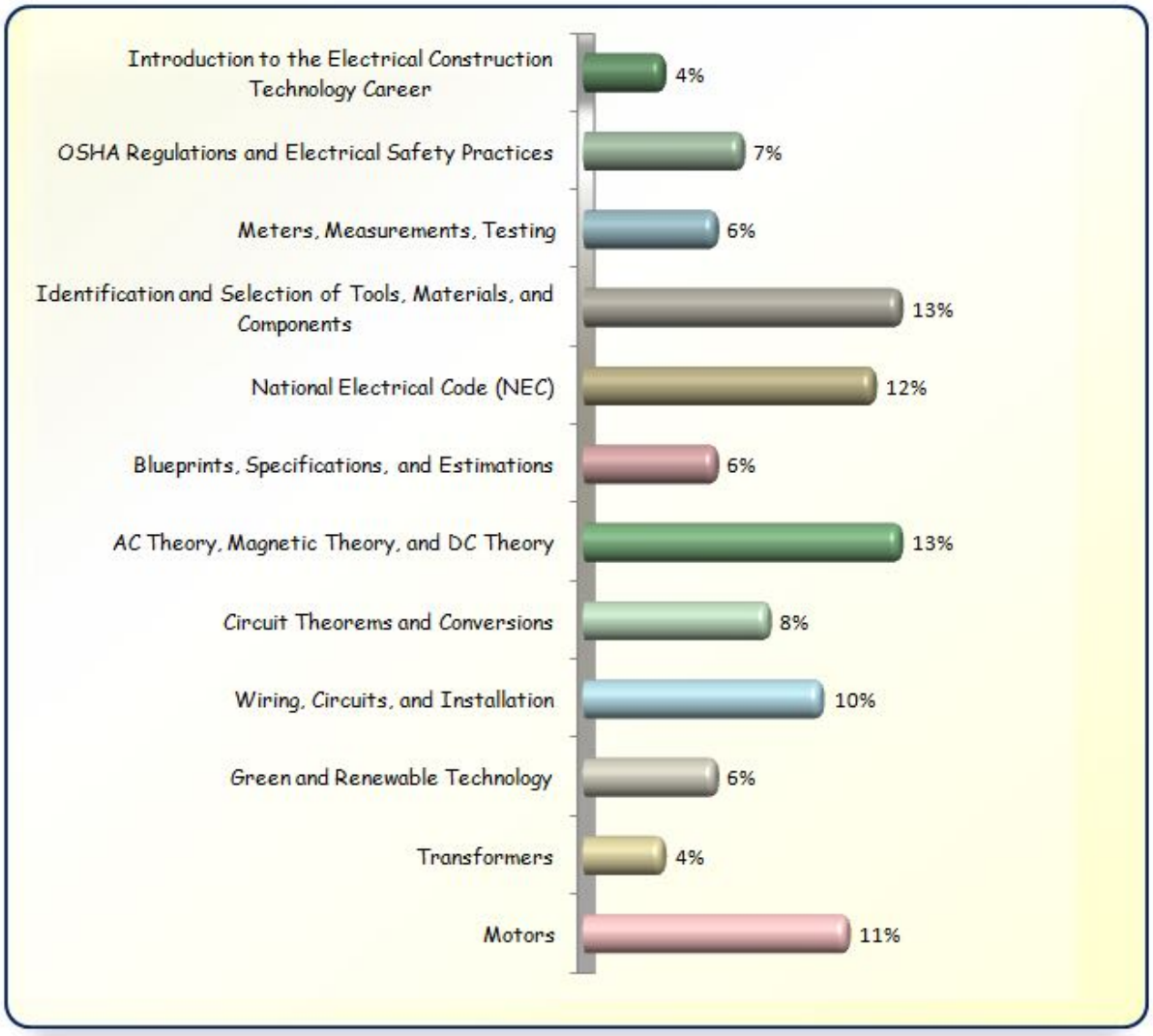
Written Assessment:

Administration Time: 3 hours
Number of Questions: 164

Areas Covered:



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Sample Questions:

Measure the current in a circuit with a/an

A. voltmeter
B. ohmmeter
C. anemometer
D. ammeter

AWG units are units used to express conductor sizes and represent the

A. Associated Wire Gage
B. American Wire Gage
C. Apiarian Wire Gage
D. Approximate Wire Gage

The AC voltage waveform is called a _____ wave.

A. cosine
B. full
C. half
D. sinusoidal

Electromotive force is measured in

A. watts
B. ohms
C. amps
D. volts

A rectifier converts

A. alternating voltage to direct voltage
B. alternative voltage to direct current
C. farads to microfarads
D. megohoms to ohms

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Performance Assessment:

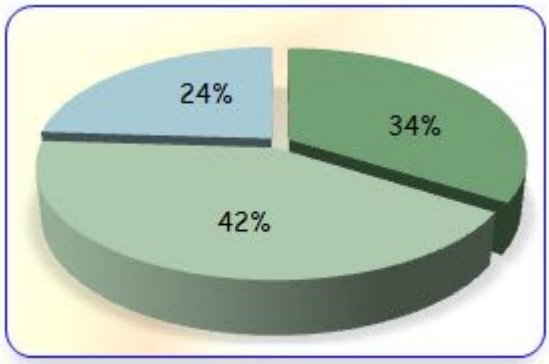
Administration Time: 3 hours and 20 minutes
Number of Jobs: 3

Areas Covered:

34% **Bend Conduit**
Installation of boxes onto the wall, proper bending and cutting techniques, safety, and time to complete Job 1.

42% **Switching and GFCI Receptacle in a Residential Setting**
Schematic drawing, installation of wiring, installation of devices, finish, trim-out, operation, safety, and time to complete Job 2.

24% **Install Two Smoke Alarms in a Commercial Setting**
Installation of components, smoke alarms, functionality, safety, and time to complete Job 3.



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Sample Job: Install Two Smoke Alarms in a Commercial Setting

Maximum Time: 1 hour

Participant Activity: The participant will install two smoke alarms in a commercial setting referring to the drawings provided, using MC 14-2 and 14-3 AWG, install two interconnected smoke alarms, use a separate circuit, and home run first smoke alarm; interconnect between the two smoke alarms.

The Association for Career and Technical Education (ACTE), the leading professional organization for career and technical educators, commends all students who participate in career and technical education programs and choose to validate their educational attainment through rigorous technical assessments. In taking this assessment you demonstrate to your school, your parents and guardians, your future employers and yourself that you understand the concepts and knowledge needed to succeed in the workplace. Good Luck!

Association for Career and Technical Education
ACTE
www.acteonline.org

PBA
PENNSYLVANIA BUILDERS ASSOCIATION

APPROVED
PENNSYLVANIA BUILDERS ASSOCIATION ENDORSED TRADE PROGRAM

The Pennsylvania Builder's Association utilizes this assessment to assist in determining competencies for granting skill certificates to students graduating from Pennsylvania secondary trade programs that have been endorsed by the Pennsylvania Builders Association (PBA).

PBA's services include support to workforce training and education by linking industry employers with educators to grow the workforce of tomorrow. PBA serves Pennsylvania communities and consumers through its steadfast efforts to protect homeownership rights and advocate for affordable housing options. PBA is affiliated with the National Association of Home Builders.

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Electrical Construction Wiring (Residential Wiring) Blueprint

This Blueprint contains the subject matter content of this Skill Connect Assessment.
Note: To fully prepare for **Electrical Construction Wiring (Residential Wiring)** SkillsUSA Championships contest, refer to the current year's SkillsUSA Championships Technical Standard, now included with your SkillsUSA Professional Membership. If you need help in accessing this benefit, contact the SkillsUSA Membership Office at 1-800-355-8422.

Standards and Competencies

Competencies are weighted throughout the assessment. The percent shown is the weight of the competency. There are 50 questions per assessment.

Define and apply safety rules and practices in residential wiring according to National Electrical Code (NEC) standards

- Apply shop rules and regulations to work stations
- List the techniques and practices used to prevent fires
- Use electrical and hand tools correctly
- Discuss the appropriate methods for lifting and climbing ladders
- Explain appropriate clothing for residential wiring
- Outline the safety requirements for installing temporary electrical services

Apply knowledge of basic wiring theory according to NEC standards

- Use wiring diagrams, schematic diagrams and prints successfully in a scenario
- Apply math calculations to circuits and measurements
- Discuss theory concepts for troubleshooting

Discuss important trade information and standards according to the NEC

- Explain the purpose and use of the National Electric Code
- Sketch and diagram effectively
- Plan the layout of an electrical installation
- Use trade catalogs and publications to solve residential wiring problems
- Correlate specifications, prints and job sites

Use basic equipment and procedures defined by industry standards

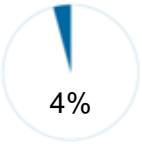
- Discuss techniques of residential and light commercial wiring
- Demonstrate wire pulling techniques

Apply knowledge of service loads and electrical safety to residential wiring situations

- Compute service loads
- Calculate individual service loads
- Determine the number of outlets permitted in a circuit
- Compute the size of service entrance conductors
- Use all types of cables including NM, MC, and service

SkillsUSA | Career Essentials: *Assessments*

Install a service entrance to meet NEC standards



- Install a main service panel
- Install circuit breakers in a panel
- Install a service entrance cable to service drop
- Install temporary electrical service

Install switch boxes and outlet boxes to meet NEC standards

- Install box hangers
- Install recess boxes for outlets
- Install hangable boxes
- Install octagon boxes
- Install surface mount boxes
- Install recessed fixture housing in a ceiling
- Install outlet boxes in dry wall, lath plaster or paneled walls

Maintain already existing wiring to meet NEC standards

- Diagnose and repair incandescent lights
- Replace existing receptacles and switches
- Troubleshoot a branch circuit
- Test wiring for correct voltages

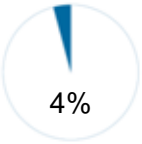
Rough in, connect, and install electrical devices to meet NEC standards

- Rough in, connect and install a single pole switch
- Rough in, connect and install a three-way switch
- Rough in, connect and install a four-way switch
- Rough in, connect and install a duplex grounded receptacle
- Rough in, connect, and install a 120-240 volt distribution panel
- Rough in, connect and install a door chime system
- Rough in, connect and install a ground fault interrupting device
- Rough in, connect and install an emergency warning system
- Rough in, connect and install a photoelectric cell control
- Rough in, connect and install a surface raceway
- Rough in, connect and install an exterior lighting fixture
- Rough in, connect and install lighting dimmers
- Rough in, connect and install TV outlets
- Rough in, connect and install telephone outlets
- Rough in, connect and install emergency lighting systems
- Rough in, connect and install appliance circuits

Install PVC and EMT conduit to meet NEC standards

- Make 90-degree bends from measurements
- Make offset bends from measurements
- Make back-to-back bends from measurements
- Make saddle bends from measurements
- Determine correct conduit measurements

Install residential telecommunications infrastructure to meet current TIA/EIA 570 standards



- Install a coaxial cable with “F” type connectors and terminating hardware
- Install unshielded twisted-pair cable, connectors and terminating hardware
- Install 110-type terminating hardware

Demonstrate professional development skills in a simulated customer service or employment situation. Examples may include:

- Job interview
- Customer service scenario
- Communications
- Decision making, problem solving and/or critical thinking

Committee Identified Academic Skills

The SkillsUSA national technical committee has identified that the following academic skills are embedded in the residential wiring training program and assessment:

Math Skills

- Use fractions to solve practical problems
- Measure angles
- Find surface area and perimeter of two-dimensional objects
- Apply Pythagorean Theorem
- Solve problems using proportions, formulas and functions

Science Skills

- Use knowledge of mechanical, chemical and electrical energy
- Use knowledge of principles of electricity and magnetism
- Use knowledge of static electricity, current electricity, and circuits

Language Arts Skills

- Provide information in conversations and in group discussions
- Demonstrate use of verbal communication skills, such as word choice, pitch, feeling, tone and voice
- Demonstrate use of nonverbal communication skills, such as eye contact, posture and gestures using interviewing techniques to gain information
- Demonstrate comprehension of a variety of informational texts
- Use text structures to aid comprehension
- Identify words and phrases that signal an author’s organizational pattern to aid comprehension
- Demonstrate knowledge of appropriate reference materials
- Use print, electronic databases and online resources to access information in books and articles

Connections to National Standards

State-level academic curriculum specialists identified the following connections to national academic standards.

Math Standards

- Numbers and operations
- Algebra
- Geometry
- Measurement
- Problem solving
- Communication
- Connections
- Representation

Source:NCTM Principles and Standards for School Mathematics. To view high school standards, visit: http://www.nctm.org/standards/content.aspx?id=16909. Select “Standards” from menu.

Science Standards

- Understands the structure and properties of matter
- Understands the sources and properties of energy
- Understands forces and motion
- Understands the nature of scientific inquiry

Source: McREL compendium of national science standards. To view and search the compendium, visit: www.mcrel.org/standards-benchmarks/.

Language Arts Standards

- Students adjust their use of spoken, written, and visual language (e.g., conventions, style, vocabulary) to communicate effectively with a variety of audiences and for different purposes
- Students use a variety of technological and information resources (e.g., libraries, databases, computer networks, video) to gather and synthesize information and to create and communicate knowledge
- Students use spoken, written, and visual language to accomplish their own purposes (e.g., for learning, enjoyment, persuasion, and the exchange of information)

Source: IRA/NCTE Standards for the English Language Arts. To view the standards, visit: www.readwritethink.org/standards/index.html.

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SCSD CTE Student Portfolio

Definition: Student portfolios are a collection of personal documents, which showcase an individual's learning experiences, goals and achievements. Student portfolios are created and controlled by the student, facilitated by the instructor, and evaluated by outside entities.

Purpose: Students should be able to leave a program with as many tools in their toolbox as possible. Student portfolios are a way to assist students in marketing themselves in future interviews, by using the portfolio to illustrate his or her skills and/or talents.

SCSD CTE Student Portfolio Requirements

☐	**Table of Contents:**	This should list each section and piece of the portfolio in the order it appears
☐	**Cover letter**	A cover letter introducing the student to a potential employer about a specific job in his or her chosen pathway. Should focus on why the student is the best candidate for the job. It should compliment the resume, not repeat it.
☐	**Resume**	Should be professionally formatted. Usually a one-page document listing the student's name, personal information (address, phone, and email), an objective, work history or extracurricular/community involvement, education, certifications/credentials, personal skills/interests, and references.
☐	**Letters of Recommendation**	Students must include at least two (2) reference letters, provided by people outside the school who are familiar with his or her work or character. The reference letters can be employment-related, personal, or they can attest to the character of the student.
☐	**Certifications/Credentials**	Students should include copies of any credentials and/or certifications they have earned as a result of their program.
☐	**Transcript**	Student provides a copy of his or her full academic transcript.
☐	**Employability Profile**	Per NYSED: The work skills employability profile is intended to document student attainment of technical knowledge and work-related skills. Documents to validate skills reported on the profile could include, but are not limited to, an employer/teacher review of student work based on learning standards and expectations in the workplace, performance evaluations and observations. Students must have at least one employability profile completed within one year prior to school exit. If a student is involved in a number of work-based learning experiences and/or is employed part time, he/she may also have additional employability profiles as completed by others knowledgeable about his or her skills (e.g.,

	employer and/or job coach).
☐ **College Research**	A written research assignment focusing on three colleges offering programs in the student's chosen career pathway.
☐ **Career Plan**	Per NYSED: "Career Plans are an important mechanism to add relevance and meaning to learning experiences across subject areas. The career development model used to create the Career Plan aligns with the CDOS standards." A Career Plan document can be found here: http://www.p12.nysed.gov/cte/careerplan/docs/SecondaryCommencLvl.pdf
☐ **Student Awards**	This section is completely open ended. Students should use this section to illustrate any awards, projects, exemplars, service learning, or scholarships, they participated or earned during their high school years. They can show evidence through pictures, project documentation, news articles, program agendas, meeting minutes, videos, etc.
☐ **Work Samples**	Examples highlighting ***only the student's best work***, demonstrating the skills and competencies he or she has mastered. These should be presented professionally and be clearly captioned. ***Should not be thought as a scrapbook.*** Potential employers are only interested in the very best examples.

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Return to TOC

D. Postsecondary Articulation

> *The self-study team reviews the postsecondary articulation agreement for the program seeking approval. Postsecondary articulation agreements help students prepare for the transition from high school to advanced study in a particular career area. Articulation agreements provide direct benefits to students such as dual credits, college credits, advanced standing, or reduced tuition at a postsecondary institution. Articulation agreements may include several school districts and/or BOCES and multiple postsecondary institutions. The school district or BOCES may enter into multiple articulation agreements for a program seeking approval.*

Process

- Reviewers confirm that the postsecondary articulation agreement is designed to prepare students for the transition from high school study to postsecondary study in the career area of the program seeking approval.
- Reviewers confirm that a postsecondary articulation agreement has been obtained that offers direct benefits to students in the program seeking approval.
- Reviewers confirm that the postsecondary articulation agreement includes the
    - prerequisite skills, knowledge, or coursework required of students to participate in the agreement
    - roles and responsibilities of each institution
    - duration of the agreement
    - endorsement by officials of each institution
- Signed articulation agreements must be on file within the school district or BOCES.

Documentation

Documentation of the postsecondary articulation agreement is maintained by the school district or BOCES and updated whenever modifications are made. Recommendations on the technical assessment selection should be included in the self-study report and reviewed by the external committee. A copy of the signed postsecondary articulation agreement must be attached to the Application for Career and Technical Education Program Approval.

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

Received:
AD 4/5/19.
Office of the Provost
SUNY Delhi

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MAR 27 2019
Career and Technical Education Team

Delhi
STATE UNIVERSITY of NEW YORK

SUNY College of Technology at Delhi
And
Syracuse City School District

Articulation Agreement
Electrical Construction and Instrumentation

Course:

ECMT 130	**Electrical Laboratory I**	**4 credit hours**

Contacts:

SUNY College of Technology at Delhi
226 Electrical Technologies Center
Delhi, NY 13753

Ms. Nancy Macdonald,
Dean, School of Applied Technologies 607-746-4073 (macdonnr@delhi.edu)
Mr. Nick Sinstack,
Electrical Construction and Maintenance Faculty, 607-746-4055 (sinstana@delhi.edu)
Mr. James Ellis,
Electrical Construction and Maintenance Faculty, 607-746-4056 (ellisjg@delhi.edu)
Mr. David Krzyston,
Electrical Construction and Maintenance Faculty, 607-746-4312 (krzystdg@delhi.edu)
Ms. Antoinette DiNoto,
Electrical Construction and Maintenance Faculty, (dinotoaa@delhi.edu)

Delhi
STATE UNIVERSITY of NEW YORK

Electrical Construction and Maintenance
Articulation Agreement

Establishing the Articulation Agreement

The School of Applied Technology at SUNY Delhi welcomes articulation agreements with secondary vocational/technical schools and other high schools that offer similar technical and skilled trades programs.

Please review the specific course description and content listed in this agreement that awards four (4) hours of college credit for demonstrated mastery of the competencies in ECMT 130 – Electrical Laboratory I. If the graduates of your program can demonstrate Mastery (90% - 100% or "A") or Competency (80% - 89% or "B") in each of the listed competencies, please complete the enclosed one-page articulation agreement with the appropriate signatures and return it to Dean of Technology at SUNY Delhi. This signed agreement, which is personalized with your school information, will be returned to you for implementation with your students.

Certifying a Student

Evaluate an eligible student's performance on each of the listed competencies. A student must achieve a Mastery level or Competency level on each of the listed competencies to receive articulated credit.

Complete the **Teacher Recommendation for College Credit** and return it to Dean of Applied Technologies, along with a copy of the **competency checklist** verifying the student's performance.

Implementing the Articulation Agreement

The Enrollment Services and the Dean of Applied Technologies offices have established procedures to acknowledge and record articulated credit achieved by eligible students from participating secondary schools.

Technology and Skilled Trades programs tend to fill quickly. Students are encouraged to apply to SUNY Delhi for their program of choice no later than January 1 and to submit the completed **Teacher Recommendation for College Credit** no later than June 30 for fall registration.

Students will be invited to attend a Bronco Ready Day where they will meet with a Faculty Advisor to choose their schedule of classes for the fall semester. Students may use their articulated credit in several ways:

- To reduce their course load for the first semester
- To reduce their course load in a subsequent semester
- To take an advanced course or elective course that would not otherwise fit into their schedule.

It is not unusual for students to choose to participate in a class for which they have already received articulated credit, in order to reinforce their skills in preparation for advanced training. Articulated

credit is recorded on the student transcript after completion of the first semester of course work with an overall GPA of at least a 2.0 "C". Students who do not make satisfactory academic progress in an advanced course may be required to repeat the course for which they received articulated credit.

Articulation Agreement Assessment and Review

This agreement will be reviewed and renewed every five (5) years, with a signed agreement by the participating parties. If either participating parties decides to cancel the agreement, they may do so at any time with a thirty (30) day written notice.

SUNY Delhi will monitor the progress of students who receive articulated credit to assess the viability of each articulation agreement. Agreements that yield no students or yield students who have a low success rate will be considered for non-renewal.

SUNY Delhi welcomes close cooperation between secondary and college faculty and encourages reciprocal campus visits to identify program strengths and weaknesses and to explore areas for further articulation.

Articulation Agreement Publicity

SUNY Delhi will list articulation agreements on its web site, in literature distributed at college fairs and during high school visits.

Secondary schools are encouraged to use this articulation agreement as a recruiting tool for incoming students and as an incentive for current students to focus on their studies.

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MAR 27 2019
Career and Technical Education Team

Delhi
STATE UNIVERSITY of NEW YORK

SUNY College of Technology at Delhi (SUNY Delhi)
And
Syracuse City School District
Articulation Agreement for Electrical Construction and Maintenance

The following agreement has been developed to meet the needs of students who are pursuing educational programs at **Syracuse City School District** and are continuing their education at SUNY Delhi.

The purpose of this articulation agreement is to provide a continuing articulation program that builds on past learning experiences and to eliminate unnecessary duplication of instruction. Specific provisions of the articulation agreement are enclosed.

When a student has completed the relevant course work, **Syracuse City School District** will submit the **Teacher Recommendation for College Course Credit** and the **Course Competencies Checklist** to verify that a student has met the required competencies to be eligible for articulated credit for the course listed below.

SUNY Delhi Course Articulated*
ECMT 130 Electrical Laboratory I (4 credits)

Jaime Alicea, Superintendent, Syracuse City School District — Date: 3/20/19
Dr. Kelli Ligeikis, Provost, SUNY Delhi — Date: 4/8/19

Syracuse City School District
School District or BOCES

725 Harrison Street
Street Address

Syracuse | NY | 13210
City | State | Zip Code

*Students must have successfully completed one semester at SUNY Delhi before articulated credit is awarded.

SUNY College of Technology at Delhi
State University of New York

Articulation Agreement Competencies

This document lists the competencies which are expected of the student who completes the course listed below. To receive credit for this course from SUNY College of Technology at Delhi, the student must meet the performance outcomes and competencies listed with a minimum grade of "B" or better (or 80% or better) for each of the competencies. Other criteria which apply to this agreement are listed in the Articulation Agreement document which must be signed by the respective institutions prior to any awarding of credit.

Course Title: Electrical Laboratory I

Course Number: ECMT 130

Credit Hours: 4

Clock Hours of Instruction: 180

Course Description:

This is a hands-on laboratory course that encompasses the planning, installation, and maintenance of residential electrical equipment. Students develop competency in performing electrical installations that meet National Electrical Code requirements. The importance of electrical diagrams is also stressed in this course through the development and application of one-line, schematic, and wiring diagrams. Students develop these skills through project work in the electrical laboratory and, when available, on field projects both on and off campus.

STUDENT'S NAME: _____

INSTRUCTOR'S NAME: _____

SCHOOL: _____

DATE: _____

SUNY Delhi- Technology Division
Course Competencies
ECMT 130 Electrical Laboratory I

Interpret and draw electrical diagrams

1. Identify the electrical symbols used in diagrams
2. Interpret and apply the information shown on
    a. One-Line diagrams
    b. Schematic diagrams
    c. Wiring diagrams
3. Draw accurate one-line, schematic, and wiring diagrams of
    a. Circuits with single pole, three-way, and four-way switches controlling lights
    b. Circuits with duplex receptacles and split-duplex receptacles
    c. Low voltage doorbell circuits
    d. Multi-wire receptacles and lighting circuits

Develop a sequence of operations for an electrical circuit

1. Write an accurate sequence of operations for a circuit using a schematic diagram as a reference
    a. Identify path of current, points where voltage is present, and operation of switches, devices, and other equipment

Perform splicing and terminations with electrical devices and equipment

1. Perform electrically and mechanically secure splicing in wire connectors
2. Perform terminations on receptacles, switches, and lights that are electrically and mechanically secure

Prepare electrical cables for installation

1. Prepare the following cables for use in electrical boxes
    b. Romex cable
    c. AC cable
    d. MC cable

Perform trade-quality cuts on conduit

1. Perform trade-quality cuts on conduit

Install grounding connections in an electrical circuit

1. Understand the importance of making proper grounding connections.
2. Install grounding connections in accordance with all current National Electrical Code requirements.

Install receptacles in an electrical circuit

1. Install duplex and split-duplex receptacles in accordance with:
2. The requirements of one-line, schematic, and wiring diagrams
3. Current National Electrical Code requirements

Install line voltage switches for control of lights and receptacles in an electrical circuit

1. Install single pole, three-way, and four-way switches in accordance with:
    a. The requirements of one-line, schematic, and wiring diagrams
    b. Current National Electrical Code requirements

Install ground fault protective devices in an electrical circuit

1. Install Ground Fault Circuit Interrupter (GFCI) receptacles in accordance with:
    a. The requirements of one-line, schematic, and wiring diagrams
    b. Current National Electrical Code requirements

Install multi-wire circuits

1. Install receptacles and lights in multi-wire circuits in accordance with:
    a. The requirements of one-line, schematic, and wiring diagrams
    b. Current National Electrical Code requirements

Install and terminate wiring in electrical panels

1. Install a single phase 120/240V electrical panel to include:
    a. A GFCI receptacle circuit
    b. A multi-wire receptacle circuit
    c. A receptacle for a clothes dryer
    d. A range receptacle
    e. Installation will be in accordance with:
    f. The requirements of one-line, schematic, and wiring diagrams
    g. Current National Electrical Code requirements

Install low voltage systems

1. Install low voltage doorbell chimes, pushbuttons, and buzzers in accordance with:
    a. The requirements of one-line, schematic, and wiring diagrams
    b. Current National Electrical Code requirements

Delhi
STATE UNIVERSITY of NEW YORK

TEACHER RECOMMENDATION FOR COLLEGE COURSE CREDIT

Please return this form by June 30 for the fall semester to ensure the timely recording of articulated credit

School: _____

(Certifying participating Secondary School)

School Address: _____

_____

School Phone #: _____

This is to certify that _____
(Student's Name)

_____
Student's Home Address

Student's Social Security #: _____ Year of Graduation: _____

has successfully completed the following course(s), and, based upon the Articulation Agreement between the participating secondary school and SUNY Delhi, it is recommended that college credit be awarded for the following course(s):
List applicable course(s) and grades:

Secondary Courses Certified			College Course Articulated		
Number	Title	Grade	Number	Title	Credit
_____	_____	_____	ECMT 130	Elect. Lab I	4
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Other Comments (please use the reverse of this page).

The undersigned certifies that the student has met the criteria as defined in the Articulation Agreement signed by representatives from the participating secondary school and SUNY Delhi.

Instructor's Signature: _____ _____

Instructor's Printed Name: _____ (Date)

Please send this completed TEACHER RECOMMENDATION form to:

Dean of Applied Technologies, 226 ETC, SUNY Delhi, Delhi, NY 13753

No later than June 30 for fall registration

THIS SECTION COMPLETED BY SUNY DELHI

Application received _____ (Date) Student accepted _____ (Date)

Fees Paid _____ (Date) Program of Study _____ (Date)

Letter of receipt sent _____ (Date) Notification letter sent _____ (Date)

GPA at end of first semester _____ # of credits awarded _____

Program faculty: The student's advisor will be: _____

Upon reviewing the Teacher Certification form above, list approved articulated courses and # of credits:

_____

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ALFRED STATE COLLEGE
STATE UNIVERSITY OF NEW YORK

SCHOOL OF APPLIED TECHNOLOGY
ARTICULATION AGREEMENT
ELECTRICAL TRADES
AND
Syracuse City Schools

Alfred State's Electrical Construction and Maintenance Electrician curriculum will offer to qualified high school graduates, credit bearing articulation for those who choose to continue their education at Alfred State. This agreement recognizes the individual strengths of both the students and the technical program from which they have successfully graduated.

To insure that the skill levels students have achieved during secondary education in the electrical trades will allow for student success at the post-secondary level, selected students will be required to meet and adhere to the following conditions in order to be awarded **six (6) credit hours** for Residential Lab 1A.

1. Candidates must meet Alfred State's admission requirements and matriculate into the Electrical Construction and Maintenance Electrician curriculum.
2. Candidates must have maintained an 85% average or better within their electrical secondary curriculum.
3. Candidates will be given a proficiency test by their instructor for each of the subjects for which college credit is given and must earn a minimum of 85%.
4. Candidates must submit a work portfolio requesting articulation during the two weeks of April.
5. Candidates must include a letter of recommendation from their technology instructor with their Articulation Agreement request.

This agreement will be reviewed and renewed every five (5) years, with a signed agreement by the participating parties. If either participating parties decides to cancel the agreement, they may do so at any time with a thirty (30) day written notice.

Alfred State

7/22/19
Irby Sullivan, Ed.D. Date
President

7/19/19
Kristin Poppo, Ph.D. Date
Provost

7-7-19
Dean, School of Applied Technology Date

C-21-19
Department Chairperson Date

Board of Public Instruction

6/11/19
Principal/Superintendent Date

5/14/19
Instructor Date

Return to TOC

E. Work-based Learning

> *Work-based learning (WBL) is the "umbrella" term used to identify activities which collaboratively engage employers and schools in providing structured learning experiences for students. These experiences focus on assisting students to develop broad, transferable skills for postsecondary education and the workplace. A quality WBL experience can make school-based learning more relevant by providing students with the opportunity to apply knowledge and skills learned in the classroom to real world situations.*
>
> *Time requirements that students in an approved program may devote to work-based learning experiences are set by administrators of the approved program. This time should be an outcome of the self-study report and external review phases of the approval process. Work-based learning experiences must be sufficient in length and rigor to contribute to student achievement of the State learning standards as well as specific technical competencies.*

Process

- The school district/BOCES and the employer cooperatively plan all work experiences.
- The school district/BOCES set up a formal procedure for the supervision/coordination of all work-based learning experiences and must ensure that work-based learning coordinators are appropriately certified.
- The school district/BOCES provide work-based learning experiences for students with disabilities
- The school district/BOCES and employer must ensure compliance with federal and state labor laws, and the State Department of Labor regulations and guidelines.
- The school district/BOCES must explore and develop work-based learning experiences in settings that are relevant to the program.
- The school district/BOCES must comply with Commissioner's Regulations and Department policy where credit towards graduation is being awarded.

Documentation

Recommendations for work-based learning should be included in the self-study report and reviewed by the external committee.

Resources

New York State Education Department Work Experience Manual
http://www.emsc.nysed.gov/cte/wbl/

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

Return to TOC

Link to: SCSD CTE Workbased Learning Resources

F. Employability Profile

> *The employability profile is a record of student achievement. That may include documentation of the student's attainment of technical knowledge and work-related skills, endorsements, licenses, clinical experience, work experience, performance on core academic Regent's examinations, performance on industry based assessments, attendance, student leadership honors and achievements and other honors or accolades of student success.*

Process

- An employability profile model is developed for the program
- A profile of student achievement is developed for each student in the program and is maintained in accordance with records and retention policies of the school district/BOCES.
- The profile of student achievement is reviewed and updated on a continuous basis by the student and the appropriate program/guidance personnel.
- The work skills to be mastered by students with disabilities should be aligned with the student's Individualized Education Program (IEP).

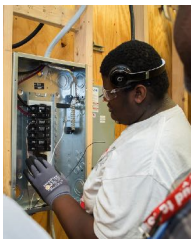
Documentation

Recommendations for the employability profile model should be included in the self-study report and reviewed by the external committee.

Source: http://www.p12.nysed.gov/cte/ctepolicy/guide.html

EMPLOYABILITY PROFILE

ELECTRICAL TRADES



Industry-Based Skill Standards

Proficiency Definitions

NA = Not Applicable **1 = Introduced** **2 = Developing** **3 = Proficient** **4 = Mastery**

	9th	10th	11th	12th
Safety				
Demonstrates proper safety practices, tool safety, use of personal protective apparel, and recognizes safety hazards commonly encountered when working with electricity				
Hand Tools				
Demonstrates proper selection and use of hand tools including pouch tools, neon testers, cable cutters, pliers and crimpers, tape measures, and multimeters				
Reading and Interpreting Blueprints / Estimating				
Reads and interprets blueprints and schematics, accurately identifies symbols, develops material lists from plans, estimates material and labor costs				
Power Tools and Multimeter use				
Demonstrates safe use of power tools including drills and drivers, sawzall, hammer drill, circular saw, powder activated tools, and pneumatic tools commonly used				
Electrical Distribution, Theory, and Service Entrances				
Understands the distribution of electrical service, basic electrical theory including Ohms Law, AC/DC, parallel and series circuits, and service entrance installation				
Wiring Methods using NMC and MC materials				
Demonstrates proper wiring methods for installations common to residential wiring using Romex and other NMC or MC cable according to NEC and utility codes				
Installation of basic switches and receptacles				
Installation of basic switches and receptacles including metal and plastic boxes, single and multiple recepticle and switch boxes, junction boxes, and low voltage wiring				
GFCI circuits and Waterproof receptacles				
installation of advanced circuitry including GFCI receptacles, waterproof recptacles, underground feeds, and other unique installation techniques				
Installation of fixtures				
Demonstrates the correct termination techniques at fixtures including ceiling, flourescent, fan/light, photocells, wall mounted lighting, and low voltage fixtures				

	9th	10th	11th	12th
Safety in a Commercial Setting (OSHA 10)				
Understands and demonstrates safe working habits in a commercial setting, participates and earns OSHA 10 certification credential				
Emergency Medical Procedures / CPR / First Aid				
Completes training in emergency medical procedures earning basic first aid and CPR lifesaver certification through an accredited provider. Idenitfies potential health risks				
Electrical Codes				
Understands and demonstrates use of National Electric Code and local codes when planning and installing residential wiring circuits in all settings				
Circuit and Load Calculations				
Demontstrates the ability to calculate loads and circuit wiring based on understanding and use of both electrical theory and codes. Can accurately complete calculations				
Installation of complex three and four way switches				
Installs complex switch circuitry including two, three, and four-way circuits in various configurations, can install simple and complex low voltage switches and relays				
Wiring Methods using Conduit and Wiremold				
Demontstrates the ability to install wiring using conduit and wiremold methods. Can use tools common to coduit installation techniques including benders and reamers				
Low Voltage circuits and installation techniques				
Demonstrates the ability to use appropriate techniques associtated with the installation of low voltage circuits and devices including installation of transformers				
Troubleshooting and Diagnosing				
Demonstrates the ability to use electrical theory, tools and equipment to diagnose and troubleshool circuitry following detailed schematics and installation guides				
Alternative Energy (wind, solar, geothermal, etc.)				
Has a basic understanding of alternative energy sources, their production, distribution, and use commonly found in residential and light commercial settings				

Industry Certifications / Credential / Endorsement	yes	no
OSHA 10 Safety Certification		

Articulated College Credit or Advanced Standing	
Alfred State University	
SUNY Delhi	
Mohawk Valley Community College	
Morrisville College	

EMPLOYABILITY PROFILE

ELECTRICAL TRADES

Student Name: _____ School Year: _____ Absences: _____

ID Number: _____ Teacher: _____ Final Grade: _____

Career Ready Practices / Career Development Standards

STANDARDS DEFINITIONS

NA = Not Applicable 1 = Developing 2 = Basic 3 = Proficient 4 = Mastery

	9th	10th	11th	12th
Acts as a responsible citizen/employee				
Is on time and prepared, follows workplace policies, demonstrates reliability and dependability, is polite and courteous to adults and peers, demonstrates appreciation, and is reliable and consistent in their actions				
Applies appropriate academic and technical skills				
Demonstrates an understanding of the academic knowledge and skills associated with their trade. Technical skills are developed with academic competencies including English language arts and science that are integrated within the CTE program.				
Attends to personal health and financial well-being				
Recognizes the benefits of physical, mental, social, and financial well-being to the importance of that success in their career. Accepts criticism and works towards self-improvement targets on a consistent basis.				
Communicates clearly, effectively, and with reason.				
Is able to communicate both verbally and in writing to express ideas and obtain information. Uses appropriate vocabulary to share information both verbally and in writing as well. Demonstrates active listening skills and verbal communication.				
Makes appropriate decisions				
Considers the environmental, social, and economic impacts of their decisions. Understands that their actions and decisions will impact other people directly. Works independently and responds positively to new ideas and suggestions.				
Demonstrates creativity and innovative thought				
Demonstrates creativity and new thinking to solve workplace problems as encountered. Is creative, innovative, and is eager to explore new ways of addressing issues and challenges that are encountered.				
Employs valid and reliable research strategies				
Seeks information to develop a deeper understanding of issues encountered. Uses technology as a tool to research, organize, and evaluate information critically incompetently. Interprets information and draws conclusions based on best analysis.				
Uses critical thinking skills and demonstrates perseverance				
Demonstrates problem-solving skills through the use of creative thinking, decision-making, and adaptability. Effectively reasons through difficult situations, and makes decisions even when faced with complex or challenging problems.				

	9th	10th	11th	12th
Models integrity, ethical behavior, and leadership				
Is accountable and transparent in all of their work and assignments. Consistently exhibits ethical behavior, and commitment to completing tasks as assigned. Develops and demonstrates leadership skills, assuming responsibility readily.				
Develops and implements a Career Plan				
Develops a career plan based on understanding of their personal goals and the career pathways that aligns to them. Develops resumes, cover letters, and examples of best work to aid in the job seeking process and/or entrepreneurial goals.				
Uses technology to enhance productivity				
Demonstrates an understanding of the use of technology related to their career pathway. Continually develops their ability to adapt to changing work environments using technology, including new tools and their associated applications.				
Works as a productive and respectful team member				
Actively participates as a member of a team recognizing and appreciating others skills and abilities. Adds to the collective value of the team, and invigorates others to add to the collective efforts and goals.				
Demonstrates reliability and dependability				
Regardless of tasks given, demonstrates reliable and dependable behaviors to meet the expectations as defined. Attendance and levels of participation meet expectations consistently. Take on additional responsibilities without prompting.				
Arrives on time and is prepared to work				
Consistently demonstrates promptness, reliability, and commitment to reporting for classes, work site experiences, and other assignments as defined. Reports prepared for work or education as requirements dictate, meets attendance requirements.				
Demonstrates safe working habits				
When engaging in worksite situations or learning labs, uses tools and equipment safely, observes general safety guidelines for material handling, and meets the expectations of maintaining a safe work environment for others.				
Demonstrates problem solving skills				
Addresses problems encountered using effective problem-solving strategies. Works to define potential solutions to problems, identifies and implements the best solution based on the information gathered and their skill and knowledge.				

Earned Technical Endorsement on Diploma **YES** ☐ NO ☐

Special Recognitions or Scholarships _____

Student Leadership Organization _____

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