

ES22 NCCER Electrical Systems Construction and Maintenance (version 201512) - Diploma

Program Information

<i>Program Name</i> NCCER Electrical Systems Construction and Maintenance	<i>Non-Occupational Program</i> No	<i>Program Development</i> Standard
<i>Program Version</i> 201512	<i>Program Award Level</i> Diploma	<i>Program Credit Hours</i> 44
<i>Program Length</i> 3 Terms	<i>PAS Program Group</i> 0500 Electrical Construction and Maintenance	<i>CIP Code</i> 460302 Electrician
<i>SOC Code</i> 472111 Electricians		

Justification

Program Description

The Electrical Systems Construction and Maintenance Technician program provides instruction in the inspection, maintenance, installation, and repair of electrical systems in residential, commercial, and industrial environments. A combination of theory and practical application is emphasized to develop academic, technical, and professional knowledge and skills. Program graduates receive a diploma as an Electrical Systems Construction and Maintenance Technician.

Occupational Trends

Over 20,000 Georgia workers are employed in 2020 as electricians. Almost 60% of those jobs require some level of post-secondary education/credentials. Average employment is expected to grow in the 2019-2029 decade by 8% nationally.

Education Programs

Programs in Electrical Systems Technology are found in vocational/technical schools, technical colleges, community colleges, and at the university level.

Actual Job/Career

Electricians install, maintain, and repair electrical wiring, equipment, and fixtures. Ensure that work is in accordance with relevant codes. May install or service street lights, intercom systems, or electrical control systems.

Employment Trends

Salary Trends

<i>Hourly Salary</i>	\$26.55
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<i>Annual Salary</i>	\$55,220.00
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<i>Salary Trend Details</i>	Salary trends obtained through US Bureau of Labor Statistics
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Occupational Analysis

<i>Duty Order</i>	<i>Duty Description</i>
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1 Understand the different work sectors, and types of work environments, in the electrical trade.

Task Order Task Description

- 1 Describe the apprenticeship/training process for electricians.
- 2 Accomplish tasks typically performed by an electrician.
- 3 Define the various sectors of the electrical industry.
- 4 Explain the responsibilities and aptitudes of an electrician.

2 Understand and follow industry safety procedures.

Task Order Task Description

- 1 Understand OSHA and how it promotes safety in the workplace.
- 2 Understand electrical hazards and how to avoid or minimize them in the workplace.

3 Understand electrical circuits, Ohm's law, Kirchoff's law, electromagnetic force, resistance, and electric power equations.

Task Order Task Description

- 1 Understand the units of measurement that are used to measure the properties of electricity.
- 2 Understand the meters used to measure voltage, current, and resistance.
- 3 Explain the basic characteristics of series and parallel circuits.
- 4 Using Kirchoff's voltage law, calculate the voltage drop in series, parallel, and series-parallel circuits.
- 5 Using Ohm's law, find the unknown parameters in series, parallel, and series-parallel circuits.
- 6 Understand Alternating Current(AC)circuits.
- 7 Install and maintain various types of motors.

4 Understand the structure and requirements of the National Electrical Code.

Task Order Task Description

- 1 Navigate the National Electrical Code.
- 2 Understand the purpose of the National Electrical Manufacturers Association and the NFPA.

5 Perform wiring operations in residential, commercial, and industrial environments.

Task Order Task Description

- 1 Identify the appropriate pull and junction boxes and sizes for a given application.
- 2 Install conduit including bends, offsets, and cutting and threading.
- 3 Use appropriate raceways, fittings, and fasteners for a given application.
- 4 Determine the allowable ampacity of a conductor for a given application.
- 5 Perform residential electrical services.
- 6 Install various types of electrical lighting.
- 7 Select and install the proper cable tray fitting for the situation.
- 8 Perform grounding and bonding tasks.
- 9 Install circuit breakers and fuses.
- 10 Perform load calculations.
- 11 Apply the key NEC requirements regarding overcurrent protection.
- 12 Install distribution equipment.
- 13 Compute the size and install transformers for a given application.
- 14 Perform commercial electrical services.
- 15 Select and install cable systems for voice, data, and video systems.
- 16 Select, size, and install electrical motor control systems.
- 17 Perform electrical services in specialty facilities.

6 Understand and interpret construction drawings.

Task Order Task Description

- 1 Interpret electrical drawings, including site plans, floor plans, and detail drawings.

2 Interpret equipment schedules found on electrical drawings.

7 Use appropriate electrical test equipment.

Task Order Task Description

1 Understand the operations of electrical test equipment.

2 Use the appropriate meter for a given work environment based on category ratings.

Program Outcomes

Order Description

- 1 The graduate will have developed the knowledge and skills to safely work with direct and alternating circuits.**
- 2 The graduate will have developed the knowledge and skills to inspect, maintain, and repair electric motors and controls.**
- 3 The graduate will have developed the knowledge and skills to diagnostically troubleshoot electrical components and systems.**
- 4 The graduate will have developed the knowledge and skills to inspect and maintain industrial PLCs.**
- 5 The graduate will have developed the knowledge and skills to understand and apply the National Electrical Code.**
- 6 The graduate will have developed the knowledge and skills to wire a residential, commercial, and/or industrial structure.**
- 7 The graduate will have developed the knowledge and skills to correctly interpret electrical prints, drawings, and schematics.**

Curriculum

ES22 NCCER Electrical Systems Construction and Maintena (version 201512)

Name	Relation	Lect Credit Hrs	Lab Credit Hrs	Total Credit Hrs	Lect Cont Hrs	Regu lar Lab Type	Reg. Lab Cont Hrs	Othe r Lab Type	Oth. Lab Cont Hrs	Total Cont Hrs	Smst Hrs
Basic Skills Courses	AND	-	-	-	-		-		-	-	8
Select 1 of the 2 English courses - 3 hrs.	OR	-	-	-	-		-		-	-	3
<u>ENGL 1010 - Fundamentals of English I</u> <u>(201003) 3 hrs</u>	NA	3	0	3	3		0		0	3	3
<u>ENGL 1005 - Applied Technical</u> <u>Communication (202014) 3 hrs</u>	NA	3	0	3	3		0		0	3	3
Select 1 of the 3 Math courses - 3 hrs.	OR	-	-	-	-		-		-	-	3
<u>MATH 1012 - Foundations of Mathematics</u> <u>(201312) 3 hrs</u>	NA	3	0	3	3		0		0	3	3
<u>MATH 1005 - Applied Technical</u> <u>Mathematics (202014) 3 hrs</u>	NA	3	0	3	3		0		0	3	3
<u>MATH 1013 - Algebraic Concepts (201312)</u> <u>3 hrs</u>	OR	3	0	3	3		0		0	3	3
<u>EMPL 1000 - Interpersonal Relations and</u> <u>Professional Development (202312) 2 hrs</u>	NA	2	0	2	2		0		0	2	2
Occupational Courses	AND	-	-	-	-		-		-	-	36

<u>COFC 1080 - Construction Trades Core</u> <u>(201714) 4 hrs</u>	AND	3	1	4	3	Lab	2		0	5	4
<u>ELTR 1000 - Fundamental Electrical Concepts</u> <u>(201412) 4 hrs</u>	NA	3	1	4	3		0	Pract icum	3	6	4
<u>ELTR 1015 - Intermediate Electrical Concepts I</u> <u>(201412) 4 hrs</u>	NA	3	1	4	3		0	Pract icum	3	6	4
<u>ELTR 1025 - Intermediate Electrical Concepts II</u> <u>(201412) 4 hrs</u>	NA	3	1	4	3		0	Pract icum	3	6	4
<u>ELTR 1035 - Advanced Electrical Concepts I</u> <u>(201412) 4 hrs</u>	NA	3	1	4	3		0		3	6	4
<u>ELTR 1055 - Advanced Electrical Concepts II</u> <u>(201412) 4 hrs</u>	NA	3	1	4	3		0	Pract icum	3	6	4
Occupational Electives 12 hrs	NA	-	-	-	-		-		-	-	12

Total Credit Hours: 44

External Standards

Order Description

Admissions Requirements

Minimum Test Scores

Accuplacer Reading Comp.	55
Accuplacer Sentence Skills	60
Accuplacer Arithmetic	34
Accuplacer Elementary Algebra	N/A

Minimum Required Age

NA

High School Diploma or GED Required

For Admission: Yes
For Graduation: Yes

Other Admission Conditions

Program Faculty/Administrative Requirements

<i>Order</i>	<i>Description</i>	<i>Type</i>	<i>Quantity</i>
1	Program Director	Full time	1
2	Instructor	Full time	1
3	Adjunct Instructor	Part time	1

Other Specific Staff Resources

Program Resources/Equipment/Facilities

Suggested Equipment List Acid brush Adhesive Adjustable wrenches Alignment tool Allen screwdrivers Ballpeen hammer Burnisher Center punch Chain nose pliers Channel lock pliers Combination wrenches Continuity tester Diagonal cutting pliers Dusting brush Electrical tape Extension driver Feeler gauge set Flat file Fuse puller Hemostat Hex key set Inspection mirror Jumper leads Kwick-draw solder Lamp puller Long chain nose pliers Magnetic nutdriver Meter (18 range 2000 OHM/V) Needle nose pliers Nutdrivers Offset screwdrivers Oiler Penlight Phillips screwdrivers Pin punch Reamer Round file Scale (6" Eng/Metric) Scissors Screwstarter Side cutters Socket set Soldering iron Soldering tips Solder puller Spline key set Standard screwdrivers Stripper/crimper Swiss pattern file Taper file Test clip Utility blades Utility knife Utility pliers Voltage tester Wire dispenser Laboratory Tools: Adjustable wrench Adjustment tools for calibration of electronics Air tools Allen wrench Alligator clips Ammeter Analog meter Awl Ballpeen hammer Blueprint machine Calibrated square wave generator Calipers Capacitor checker Chart recorder Cold chisel Combination pliers Contour band saw Current probe Data recorder (digital cassette) for PC systems Degaussing coil Diagonal pliers Digital programmer Disc exerciser Drafting table Drill bits Electric drill Electronic sequencer Extension cord Feeler gauge File set First aid kit Flashlight Flow diagram Fork lift Fuse puller Grease gun Hand reamer Hand drill Heat gun Heat sinks Hex wrench Hydraulic test stand Industrial terminal (CRT) for PC systems Insulation tester Keyboard Light pen Line voltage monitor Logic analyzer Logic probe Logic clip Logic pulsers Long nose pliers Magnifying glass Micrometer Microprocessor Microwave tester Mill file Mirror Modulation scope Module checkers Multimeter Needle nose pliers Nibbling tools Offset screwdriver Optoelectronic sensor Oscilloscope Phillips screwdriver Pin straightener Plotter Pneumatic logic controller Pressure gauge kit Printer Programmable calculator Punch set (center, pin, prick) R-F probe Resistor/capacitor substitution box Rivet gun ROM wave generator ROM cleaver Rust remover Safety glasses Sine wave generator Snake Snap ring pliers Socket wrench Socket set Soldering iron Spectrum analyzer Spring tension gauge Stopwatch Strap wrench Surface grinder Tachometer Tap and die set Tape Teach pendant Appropriate to curriculum Appropriate classroom and lab space