

ELECTRICIAN - IDL / Electrician (VA Only)

DESCRIPTION

The Electrician Program is offered on-site for VA students & in a hyflex format that prepares our graduates for a career in the field of electricity both residential and commercial, solar, motor control and low voltage. Graduates will know the necessary core and specialty skills to successfully meet electrician standards and function in a new market. Instructional topics include: electrical safety, theories and tools associated with electricity, the National Electrical Code (NEC), wiring, power distribution, circuits, AC/DC motors and low voltage, cabling and green electricity. Special topics for this program will prepare students for an array of job opportunities including, but not limited, to electrical installation in residential and commercial settings.



Interactive Hyflex sessions may be taught in a classroom setting or a laboratory located on campus these classes are delivered online and off campus. Instructors facilitate each lecture in addition to group discussions to keep the course exciting and fun. Students will also experience various resources such as Summit's online library. At the beginning of each course students are provided a syllabus and class calendar explaining in-person required attendance (or) sessions scheduled for online learning.

Participation is essential to student success in hyflex classes. Students are required to participate just as if they were in a face-to-face course. This means that in order to get full credit for participation: Students will have to complete discussion board assignments, responses to peers, lesson projects, collaboration, and tests in a timely matter.

CLASSIFICATION OF INSTRUCTION (CIP) CIP# CODE: 46.0302
Electrical and Power Transmission Installers, Electrician

ADMINISTRATIVE STANDARD OCCUPATIONAL CLASSIFICATION (SOC): 47-2111, 47-3013.00
Control Electrician, Electrical Journey Person, Electrical Troubleshooter, Electrician, Housing Maintenance Electrician, Industrial Electrician, Inside Wireman, Maintenance Electrician, Paper Mill Electrician, Wireman. Helpers-- Electrician, Installation, Maintenance, and Repair Workers

DEFINITION OF CLOCK HOUR TO CREDIT HOUR CONVERSION

One Quarter Credit Hour = 10 classroom /lecture hours; or 20 lab/shop hours; or 30 extern hours

*Homework Hours – are estimated and not included in total Clock Hours or Quarter Credit Hours

In the application of this section, for the purpose of official records of the amount of Credit hours Summit College shall round education credit hours down to the nearest half hour of credits actually completed i.e. .50 or .00 – Financial Aid Title IV Clock Hour to Credit hour Conversion may be different please see financial aid for conversions based on Quarter credits.

DESCRIPTION OF INSTRUCTION:

§94909(a)(5) The Electrician Program is taught by Hybrid/Hyflex lecture, lab (except for students enrolling in the Veterans program which is on campus) lecture hours include faculty instruction, classroom activities, assessments, etc. The lab hours are comprised of hours specific to gaining industry related skills included, but not limited to, exercises and activities that strengthen and broaden a student's understanding of the job duties required of them in their chosen field. The hybrid flexible, or Hyflex, course format is an instructional approach

that combines face-to-face (F2F) and online learning. Each class session and learning activity is offered in-person, synchronously online, and asynchronously online.

• Total Instructional Hours 720 • Total Quarter Credit Hours 55 • Weeks of Classes 36 • Method of Delivery: Hybrid *Residential for VA students		THEORY HOURS		LABORATORY HOURS		MINIMUM WORK OUTSIDE OF CLASSROOM	TOTAL INSTRUCTIONAL HOURS & CREDITS	
Module Number & Title		Clock	Credit	Clock	Credit	Hours	Clock	Credit
Prerequisite Modules								
EL1400	<i>Electrical Theory</i>	50	5	30	1.5	14	80	6.5
EL1410	<i>Measuring for Electricians</i>	60	6	20	1	14	80	7
EL1420	<i>National Electrical Code</i>	60	6	20	1	10	80	7
EL1430	<i>Electrical Circuits</i>	60	6	20	1	10	80	7
EL1440	AC Machines & Motors	30	3	50	2.5	10	80	5.5
EL1450	Low Voltage	30	3	50	2.5	10	80	5.5
EL1460	Green Electricity	30	3	50	2.5	10	80	5.5
EL1470	Residential Installation	30	3	50	2.5	10	80	5.5
EL1480	Commercial Installation	30	3	50	2.5	10	80	5.5
Totals		380	38	340	17	98	720	55

Teacher/Student Ratio: 1:35 Lecture/1:20 Lab

on Ground Lecture (Didactic) and Lab Skills

*REQUIREMENTS FOR COMPLETION:

Students must complete courses through demonstrating a satisfactory knowledge of the learning objectives for each course. This is tracked through the student's cumulative GPA and is also monitored through their attendance. Students are required to have 80% overall program attendance. All courses within this program must be complete in order for the student to be eligible for a certificate of completion.

Student will receive a Certificate of Completion once all requirements of completion have been satisfied. *

INSTRUCTIONAL MATERIALS/EQUIPMENT

The student will be involved in the simulated wiring of all key areas of a residential installation. The student will also experience hands on commercial wiring techniques, including feeder and branch circuits, including main panels and sub-panels. The student will learn fire alarm control panel applications and wiring configurations. The student will also receive hands-on experience with data connections and local area networks. Analog, Digital, and ip-based Communications will be wired and tested for proper operation.

Residential Application:

- 100A/1P/3W Load Center w/Meter Socket
- 125A/1P/3W Load Center

Commercial Application:
200A/208V/3P/4W Panel Board

FACP Application:

- 1 GE Fire Alarm Control Panel
 - 4-wire smoke detector
 - Pull Station
 - Audible horn
 - Fractional Horsepower AC Induction Motor mounted and pre-wired
 - Fractional Horsepower DC Shunt Wound Motor mounted and pre-wired
 - Wall mounted and pre-wired AC Inverter Drive (VFD)
- 2-wire smoke detector
SPST toggle switch 15A @ 125VAC
Strobe
Horn/strobe

- Wall mounted and pre-wired Magnetic Motor Starter
- Wall mounted and pre-wired Manual Motor Starter
- Wall mounted and pre-wired External Switches and Speed Control Potentiometer enclosure used in conjunction with AC Inverter Drive
- Wall mounted and pre-wired Remote “Start/Stop” pushbutton station used in conjunction with Magnetic Motor Starter
- Wall mounted and pre-wired Control Circuit Transformer used in conjunction with Magnetic Motor Starter
- Wall mounted and pre-wired 3 pole 208 Volt
- Fused Safety Disconnect Switch
- Wall mounted and pre-wired 120 Volt Power

UNIFORM/EQUIPMENT/CONSUMABLES

2- Electrician Shirts -Safety Glasses, & Classroom consumables as needed

BOOK TITLES / DIGITAL COURSEWARE

ISBN Number

Ugly's Electrical Reference,	9781455922970
NFPA 70: National Electrical Code,	9781337900348
Delmar's Standard Text Book of Electricity	9781111639549
Lab Manual: Introduction to Low Voltage Systems Edition	9781305538375
The Complete Lab Manual for Electricity	9780357425763
Electrical Wiring Residential Edition	9780357371589
Illustrated Guide to the NEC Edition	9781111313470
Practical Problems in Mathematics for Electricians, Edition	9781337798761
Understanding Motor Control	978133702818
Electric Motor Control	9780357360675
Electrical Wiring Commercial	9781111639532
Introduction to Low Voltage	9780357676073
Energy, Environment and Sustainability	9781111639969
The Electrician's Guide to Photovoltaic System Installation	9781111542702
Renewable Energy & Sustainable Design	Web Based
American Safety Council, OSHA 2020 Edition - Digital Courseware	Web Based
American Health Care Academy, CPR/AED/First Aid-Digital Courseware	

GRADING SCALE & BREAKDOWN

Grade	Range	Points	Grade	Range	Points
A	96-100	4.0	C+	76-79	2.3
A-	90-95	3.7	C	70-75	2.0
B+	87-89	3.3	C-	67-69	1.7
B	83-86	3.0	D+	63-66	1.3
B-	80-82	2.7	D	60-62	1.0
			F	0-59	0

Test	25%
Quiz	15%
Homework	10%
Attendance	10%
Participation	10%
Laboratory	30%

MODULE DESCRIPTION**Title: Electrical Theory**

Course Number: EL1400 /IDL EL1400_0
 Credit/Clock Hours: 6.5 -- 50 Lecture / 30 Lab
 Homework Hours: 14
 Course Length: 4 Weeks/80 hours
 Prerequisite: None

This course introduces students to the fundamentals of safety, electrical theory, Ohm's Law, static charges, resistors, magnetism, voltage, wattage, and other measures of power. Upon completion of the course, students will learn concepts of energy, Kirchhoff's Law, Thevenin's and Norton's theorems, the Electron Flow Theory, Conventional Current Flow Theory, Electron Theory of Magnetism, and the effects of electric current on the body. Topics include general safety rules when working with electric equipment or circuits, early history of electricity and atomic structure, static electricity and the basic principles and terms associated with magnetic concepts. Students will participate in CPR and First Aid training and OSHA 10 training.

Title: Measuring for Electricians

Course Number: EL1410 /IDL EL1410_0
 Credit/Clock Hours: 7 -- 60 Lecture/ 20 Lab
 Homework Hours: 14
 Course Length: 80 hours / 4 Weeks
 Prerequisite: None

This course introduces students to the fundamentals of mathematics and measuring. Students will review relevant mathematical concepts such as averages, estimates, powers, roots, measurement, ratio and proportions. Concepts such as formulas, Ohms theory and basic trigonometry will be discussed. In an applied setting, measuring instruments will be introduced such as: analog meters, voltmeters, multirange voltmeters, reading a meter, ammeter, ammeter shunt, DC- AC clamp on ammeters, ohmmeters, bridge circuits and one family dwelling load calculations.

Title: National Electrical Code Application

Course Number: EL1420 /IDL EL1420_0
 Credit/Clock Hours: 7 -- 60 Lecture/ 20 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: None

This course introduces students to definitions, terms, and organization of the National Electrical Code (NEC). Upon completion of the course, students will be able to navigate through the NEC book in order to adhere to regulations and follow all requirements. The majority of the NEC book will be reviewed with attention to utilizing best practices in the field and applying safe electrical practices.

Title: Electrical Circuits

Course Number: EL1430 /IDL EL1430_0
 Credit/Clock Hours: 7 -- 60 Lecture/20 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: None

This course provides students with the skills and knowledge required to learn the rules governing the values of resistance, voltage, current, and power in a series circuit, and the divisions of transformer principles, voltage and current values. Upon completion of the course, students will learn a basic understanding of how voltage drop impacts devices that are connected in a series, how current flows through a series circuit, and identify rules for solving electrical values of circuits. Topics include but are not limited to, resistive-inductive series and parallel circuits, resistive-capacitive series and parallel circuits, series, parallel, and combination circuits.

Title: AC Machines & Motors

Course Number: EL1440 /IDL EL1440_0
 Credit/Clock Hours: 5.5 -- 30 Lecture / 50 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: 1400/1410/1420/1430

This course is designed to introduce students to the difference between AC and DC machines and concepts. Upon completion of the course, students will be able to describe the theory of operation of a DC generator, list and discuss the differences between different types of generators, draw schematic diagrams, explain the differences of AC alternators and how to interpret the NEC when determining how to connect and determine protective devices. Topics include major types of generators, counter torque techniques, armature winding and reaction, controlling, cumulative, and differential compounding, and AC components such as three-phase motors and alternators, and the rotating magnetic field.

Title: Low Voltage

Course Number: EL1450 /IDL EL1450_0
 Credit/Clock Hours: 5.5 -- 30 Lecture / 50 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: 1400/1410/1420/1430

This course is designed to introduce students to low voltage electrical systems including audio, networking and technology equipment, power supplies, batteries, emergency systems, fire alarms, security systems and closed-circuit television. The students will also discuss the National Electrical Codes associated with circuits, fiber-optic cabling, telecommunications, and wireless communications. Topics include: speakers, amplifiers, computer-networking systems, generators, wiring of fire alarms, optical fiber cables, telephone and residential cabling, security systems wiring, antennas, wireless and

satellite communication, and closed-circuit television systems.

Title: Green Electricity

Course Number: EL1460 /IDL EL1460_0
 Credit/Clock Hours: 5.5 -- 30 Lecture/50 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: 1400/1410/1420/1430

This course is designed to introduce students to alternative energy systems through installation and maintenance procedures. Upon completion of the course, students will learn the components, systems and typologies for monitoring system function and performance, specific alternative energy systems such as solar, wind, hydrogen and battery backup systems, and key components of circuit configuration related to alternative energy installation. Topics include electrical theory for renewable energy, photovoltaic cells (PV) and applications, wind turbine power generation, measurements and mechanical construction, and fuel cell principles of operation.

Title: Residential Installation

Course Number: EL1470 /IDL EL1470_0
 Credit/Clock Hours: 5.5 -- 30 Lecture/ 50 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: 1400/1410/1420/1430

This course introduces students to definitions, terms and organization of wiring installations for residential dwellings. Upon completion of the course, students will learn NEC requirements for residential dwellings. Applied topics include foundational provisions related to general installation of boxes and enclosures, cables, single-family and multifamily dwellings. Students will be expected to demonstrate wiring ability in a simulated one-family dwelling and multi-family dwelling. Special attention will be given to proper installation practices and accurate load calculations.

Title: Commercial Installation

Course Number: EL1480 /IDL EL1480_0
 Credit/Clock Hours: 5.5 -- 30 Lecture / 50 Lab
 Homework Hours: 10
 Course Length: 80 hours / 4 Weeks
 Prerequisite: 1400/1410/1420/1430

This course introduces students to definitions, terms and organization of wiring installations for commercial dwellings. Upon completion of the course, students will learn NEC requirements for commercial industry. Applied topics include foundational provisions related to load calculation differences in non-dwellings and commercial facilities. A review of equipment and space requirements for panel board, switch boards, and motor control centers. Students will understand Class I, II and III location as well as the parameters for Divisions 1 and 2 within operating conditions. Special occupations and special conditions and their provisions, regulations and NEC codes will be discussed.