ELECTRICAL/ELECTRONICS TECHNOLOGY – ELECT/ELTRN

Tish Young, Dean
Physical Sciences and Engineering Division
Physical Sciences Building, Room 263

Possible career opportunities

The types of jobs and careers involving electrical/electronics include: electrical, medical, industrial, and commercial electronical programmable logic controller systems; computers; consumer products; radio and television; instrumentation; communications; automotive and others.

Program-level student learning outcomes

Program learning outcomes are subject to change. The most current list of program learning outcomes for each program is published on the DVC website at **www.dvc.edu/slo**.

Associate in science degree Electrical/electronics technology

Students completing the program will be able to...

A. identify common electrical circuit components and their use.

B. solve AC and DC Circuits for Voltage, Current, Resistance, Power, and other parameters.

C. operate and understand common laboratory instruments used in the analysis, construction, and troubleshooting of AC and DC circuits.

D. apply specific sections of the national electrical code to electrical systems.

This program prepares students for jobs installing, repairing, maintaining and servicing electrical and electronics equipment. Electrical/electronics jobs are found in the fields of electrical, medical, industrial, commercial systems, programmable logic controller systems, automotive, communications and others. The following courses are part of the Electricians Trainee Program and approved by the Division of Apprenticeship Standards: ELECT-120, 121, 130, 220, 230, 266, 267, 271, ELTRN-210 and CNT-103.

Selected courses may meet some of the lower division requirements for bachelor of science programs in engineering technology and industrial technology at certain California State University campuses and private technical colleges. Consult with electronics department faculty and college counselors for more information.

To earn an associate in science with a major in electricity/electronics, students must complete each course used to meet a major requirement with a "C" grade or higher, maintain an overall GPA of 2.5 or higher in the coursework required for the major and complete general education requirements as listed in the catalog. Certain courses may satisfy both major and general education requirements; however, the units are only counted once.

required courses:		*units*
ELECT-266	Electrical Codes: Articles 90-398	3
plus at least 4 units from:		
ELECT-120	Direct Current Circuits	4
ELTRN-120	Direct Current Circuits	4
plus at least 4 units from:		
ELECT-121	Alternating Current Circuits	4
ELTRN-121	Alternating Current Circuits	4
plus at least 12 units from:		
ELECT-130	Motor and Motor Controllers	4
ELECT-220	Circuit Diagnosis and Analysis: Troubleshooting	2
ELECT-230	Electro-Mechanical Equipment	2
ELECT-271	Programmable Logic Controllers	4
ELTRN-210	Linear Circuits	4
plus at least 3 units from any course not used above, or:		
CNT-103	Voice, Video and Network Cabling	2
CONST-110	Occupational Safety	2
ELECT-267	Electrical Codes: Articles 400-830	3
ELTRN-107	Introduction to Robotics	2
ELTRN-116	Electronics I	3
	total minimum required units	**26**

Certificate of achievement Electrical/electronics technology

Students completing the program will be able to...

A. identify common electrical circuit components and their use.

B. solve AC and DC Circuits for Voltage, Current, Resistance, Power, and other parameters.

C. operate and understand common laboratory instruments used in the analysis, construction, and troubleshooting of AC and DC circuits.

D. apply specific sections of the national electrical code to electrical systems.

This program prepares students for jobs installing, repairing, maintaining and servicing electrical and electronics equipment. Electrical/electronics jobs are found in the fields of electrical, medical, industrial, commercial systems, programmable logic controller systems, automotive, communications and others. The following courses are part of the Electricians Trainee Program and approved by the Division of Apprenticeship Standards: ELECT-120, 121, 130, 220, 230, 266, 267, 271, ELTRN-210 and CNT-103.

To earn a certificate of achievement, students must complete each course used to meet a certificate requirement with a "C" grade or higher and maintain an overall GPA of 2.5 or higher in the coursework required for the certificate.

required courses:		*units*
ELECT-266	Electrical Codes: Articles 90-398	3
plus at least 4 units from:		
ELECT-120	Direct Current Circuits	4
ELTRN-120	Direct Current Circuits	4
plus at least 4 units from:		
ELECT-121	Alternating Current Circuits	4
ELTRN-121	Alternating CurrentCircuits	4
plus at least 12 units from:		
ELECT-130	Motors and Motor Controllers	4
ELECT-220	Circuit Diagnosis and Analysis: Troubleshooting	2
ELECT-230	Electro-Mechanical Equipment	2
ELECT-271	Programmable Logic Controllers	4
ELTRN-210	Linear Circuits	4
plus at least 3 units from any course not used above, or:		
CNT-103	Voice, Video and Network Cabling	2
CONST-110	Occupational Safety	2
ELECT-267	Electrical Codes: Articles 400-830	3
ELTRN-107	Introduction to Robotics	2
ELTRN-116	Electronics I	3
	total minimum required units	**26**

Certificate of accomplishment Electrical/electronics technology

Students completing the program will be able to...

A. identify common electrical circuit components and their use.

B. solve AC and DC Circuits for Voltage, Current, Resistance, Power, and other parameters.

C. operate and demonstrate understanding of common laboratory instruments used in the analysis, construction, and troubleshooting of AC and DC circuits.

D. apply specific sections of the national electrical code to electrical systems.

To earn a certificate of accomplishment, students must complete each course used to meet a certificate requirement with a "C" grade or higher and maintain an overall GPA of 2.5 or higher in the coursework required for the certificate.

required courses:		*units*
ELECT-266	Electrical Codes: Articles 90-398	3
plus at least 4 units from:		
ELECT-120	Direct Current Circuits	4
ELTRN-120	Direct Current Circuits	4
plus at least 4 units from:		
ELECT-121	Alternating Current Circuits	4
ELTRN-121	Alternating Current Circuits	4
	total minimum required units	**11**

ELECT-110 Introduction to Electricity

2 units SC

- *27 hours lecture/27 hours laboratory per term*
- *Recommended: MATH-090 or MATH-090E or MATH-090SP or equivalent*
- *Note: This course is not a requirement for the electronics/electricity sequence.*

This is an introductory course in electrical concepts, components, systems, and equipment. Ohm's and Kirchoff's laws are used to calculate and measure resistance, voltage, amperage, and power in circuits. AC components, such as coils, transformers, capacitors, and motors are also covered. Students will build and measure circuits and everyday electrical devices using both digital and analog equipment. Emphasis is placed on practical aspects of circuits and components. CSU

ELECT-120 Direct Current Circuits

4 units LR

- *54 hours lecture/54 hours laboratory per term*
- *Note: This course is approved by the Division of Apprenticeship Standards in the electrician trainee program.*

This course introduces scientific principles and hands-on applications of direct current (DC) electricity, focusing on measurement and diagnosis of series, parallel, and combination circuits. These fundamental knowledge and skills are necessary for those planning careers and/or further study in electronics, electricity, or related fields, such as heating, ventilation, and air conditioning (HVAC), building systems, industrial maintenance, electrical/electronics (EE) technology, and energy systems. CSU

ELECT-121 Alternating Current Circuits

4 units LR

- *54 hours lecture/54 hours laboratory per term*
- *Recommended: ELECT-120 or equivalent*
- *Note: This course is approved by the Division of Apprenticeship Standards in the electrician trainee program.*

This course is an in-depth study of the theory and application of alternating current (AC) including series, parallel, and combination resistive/inductive (RL), resistive/capacative (RC), and resistive/inductive/capacative (RLC) circuits. Students will construct, measure, and analyze circuits using computer simulation and actual components with signal generators and oscilloscopes. CSU

ELECT-130 Motors and Motor Controllers

4 units SC

- *54 hours lecture/54 hours laboratory per term*
- *Recommended: ELECT-120 or equivalent*

This course introduces the function, operation and characteristics of various types of direct current, alternating current, single phase and three phase motors. The course will explore the basic principles and practices of electric motor control including electro-mechanical and solid state digital devices, ladder logic, standard circuits, starters, transformers, relays, timers, and other devices. CSU

Electrical/electronics technology

ELECT-150 Topics in Electricity

.3-4 units SC

- *Variable hours*

A supplemental course in electricity designed to provide a study of current concepts and problems in electricity. Specific topics will be announced in the schedule of classes. CSU

ELECT-220 Circuit Diagnosis and Analysis: Troubleshooting

2 units SC

- *27 hours lecture/27 hours laboratory per term*
- *Prerequisite: ELECT-120 and ELECT-121 or equivalents*

This course presents troubleshooting of electro-mechanical systems and sub-systems for various machines and equipment used in residences, commercial buildings, and industrial complexes. Emphasis is placed on developing skill in reading and understanding diagrams in conjunction with proper troubleshooting procedures. Several types of diagrams will be examined during this course including Block, Pictorial, One-line, Wiring, Pictorial, Terminal, Schematic, Esterline, and more. CSU

ELECT-230 Electro-Mechanical Equipment

2 units SC

- *27 hours lecture/27 hours laboratory per term*
- *Prerequisite: ELECT-120 and ELECT-121 or equivalents*

This course presents the identification, installation, operation, and maintenance of residential/commercial/industrial systems and components. The focus is on electrical components and systems, which are related to interface devices such as mechanical, hydraulic, and pneumatic systems and their controllers. CSU

ELECT-266 Electrical Codes: Articles 90-398

3 units SC

- *54 hours lecture per term*
- *Note: Same as CONST-266. Students may petition to repeat when code changes. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.*

This course covers the interpretation of the National Electrical Code (NEC) for general requirements, wiring and protection, wiring methods and materials (articles 90-398). Safety installation practices will be presented.

ELECT-267 Electrical Codes: Article 400-830

3 units SC

- *54 hours lecture per term*
- *Note: Same as CONST-267. Students may petition to repeat when code changes. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree.*

This course covers the interpretation of the National Electrical Code (NEC) for equipment for general use, special occupancies and special equipment (articles 400-830). Safety installation practices will be presented.

ELECT-271 Programmable Logic Controllers

4 units LR

- *54 hours lecture/54 hours laboratory per term*
- *Recommended: ELECT-120 or equivalent*

This course will cover programmable logic controller equipment, hardware, and programming. The topics include system descriptions, internal and input/output operations, installation and testing, troubleshooting and maintenance, ladder diagrams, programming of counters, timers, and inputs/outputs, and other programming commands. CSU

ELECT-299 Student Instructional Assistant

.5-3 units SC

- *Variable hours*
- *Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.*

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled. CSU

ELTRN-107 Introduction to Robotics

2 units SC

- *27 hours lecture/27 hours laboratory per term*
- *Note: Students may petition to repeat this course when software or hardware is changed. Only the first course completed will be applied toward a degree or certificate requirement. Units for both courses will apply towards the 60 units required for the degree. Credit by examination option available.*

This course introduces the science and technology involved in robotic systems. Beyond basic science, topics include input and output devices and programmable controllers and programming coding. Working independently or in teams, students will design and build circuits and kinematic structures that sense and interact with their environment. Using simple programming languages, students will work with a variety of microprocessors, including Arduino, Parallax, VEX, Lego, and others. This course prepares students for more advanced studies in robotics and related technologies, such as those used in building controls systems and industrial applications. CSU

ELTRN-116 Electronics I

3 units SC

- *45 hours lecture/27 hours laboratory per term*
- *Note: Credit by examination option available.*

This course is an overview of electronic circuit fundamentals and devices. Students will construct, analyze, verify, and troubleshoot common electronic circuits using appropriate techniques and test equipment. CSU

ELTRN-120 Direct Current Circuits

4 units LR

- *54 hours lecture/54 hours laboratory per term*

Basic direct current (DC) theory covering OHM's Law, series circuits, parallel circuits, series-parallel circuits, basic residential wiring and ladder logic. Also includes related laboratory experience, including use of software to simulate electrical circuits. CSU

ELTRN-121 Alternating Current Circuits

4 units LR

- *54 hours lecture/54 hours laboratory per term*
- *Recommended: ELTRN-120 or equivalent*

An in-depth study of alternating current (AC) circuits involving capacitance and inductance. Topics include RL, RC, RLC and resonant circuits. The course covers 3-phase circuits, computer-simulated circuits, and related laboratory experience. CSU

ELTRN-150 Topics in Electronics

.3-4 units SC

- *Variable hours*

A supplemental course in electronics to provide a study of current concepts and problems in electronics and related subdivisions. Specific topics will be announced in the schedule of classes. CSU

ELTRN-210 Linear Circuits

4 units LR

- *54 hours lecture/54 hours laboratory per term*
- *Recommended: ELECT-121 or equivalent*
- *Note: This course is part of the Electrician Trainee Program approved by the Division of Apprenticeship Standards*
- *Formerly ELTRN-102B*

A study of operational amplifiers, timers, phase-locked loops, and other active devices. Includes analysis and design of basic circuits such as active filters and analog communication circuits. Also includes related laboratory experience. CSU

ELTRN-299 Student Instructional Assistant

.5-3 units SC

- *Variable hours*
- *Note: Applications must be approved through the Instruction Office. Students must be supervised by a DVC instructor.*

Students work as instructional assistants, lab assistants and research assistants in this department. The instructional assistants function as group discussion leaders, meet and assist students with problems and projects, or help instructors by setting up laboratory or demonstration apparatus. Students may not assist in course sections in which they are currently enrolled. CSU