



Electrical Technology (ELT)

Program Information

Electrical wiring is an integral part of industry, commercial enterprises, and residential homes. The Electrical/Instrumentation Technology curriculum integrates basic electrical skills and high tech instrumentation for a wide range of industrial employment. The term “instrumentation” refers to instruments used to measure and control manufacturing conversions or treating processes. Knowledge of electricity and process control gives a person a more marketable skill to offer all industries. These fields expand into SMART instruments, PLC/DCS interface and AC variable frequency motor controls. The Electrical Technology program is designed to teach the basic principles of electricity, the National Electric Code, and the safe installation of electrical wiring and equipment. Electrical/Instrumentation Technology is designed to teach basic instrumentation for measurement and control in manufacturing. Through the various courses, a student will gain knowledge and practical hands-on experience in both technologies for servicing, troubleshooting and monitoring these systems and equipment.

Occupational Choices

Electrical and electronics installers and repairers install, repair, or replace a variety of electrical equipment in telecommunications, transportation, utilities, and other industries. Automated electronic control systems are becoming increasingly complex. As a result, repairers use software programs and testing equipment to diagnose malfunctions. Among their diagnostic tools are multi-meters which measure voltage, current, and resistance and advanced multi-meters, which measure the capacitance and inductance. Electrical and electronics installers and repairers work on factory floors, where they are subject to noise, dirt, vibration, and heat. Most engineering technicians work at least 40 hours a week in laboratories, offices, manufacturing or industrial plants, or on construction sites. Some technicians may even be exposed to hazards from equipment, chemicals, or toxic materials.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2017 Edition, 2015 Survey

Average Full-Time Wage

The median annual wage of electrical and electronics installers and repairers was \$55,160 in May 2015. The lowest 10 percent earned less than \$31,410, and the top 10 percent earned more than \$88,130.

Source: Bureau of Labor and Statistics Occupational Outlook Handbook, 2016-2017 Edition, 2015 Survey

Additional Requirements

- Student must be at least 16 years of age.
- Student must have an official copy of high school transcript or GED certificate and transcript from other colleges on file in the admissions office.
- Student must take the ACCUPLACER test.
- Student must be able to perform simple mathematical computations correctly.

Awards Available

Associate in Applied Science Degree
Electrical Technology

Associate in Applied Science Degree
Electrical Technology
Instrumentation Concentration

Short Term Certificate
Electrical Technology
Electronics/Instrumentation/Electrical
Technicians Helper Concentration

Program Contact

Edward Abrasley
Program Coordinator/Instructor
334-420-4369
Location: Patterson Campus - Bldg. M

As part of ongoing planning and evaluation, the College regularly evaluates student learning outcomes for each program.

Estimated Program Length & Cost *

<u>Award</u>	<u>Length</u>	<u>Credit Hours</u>	<u>Tuition Fees</u>	<u>Books</u>	<u>Tools</u>	<u>Supplies</u>
Associate Degree	6 Terms	76	\$11,020	\$1,920	\$600	\$300
Short Term Certificate	3 Terms	29	\$4,004	\$1,000	\$600	\$200

* Tax not included. Prices are subject to change without prior notice; cost of books may vary considerably among suppliers. Cost of general education books is in addition to the total listed above. The length of the program is based on full-time status of 12-15 credit hours per term. Enrollment in transitional level general education courses will alter the length of the program.

Associate in Applied Science Degree Electrical Technology

Required Technical Courses (54 credit hours)

Course	Title	Hrs
ELT-104	Distribution Systems	3
ELT-108	DC Fundamentals	3
ELT-110	Wiring Methods	3
ELT-112	Concepts of Alternating Current	5
ELT-114	Residential Wiring Methods	3
ELT-117	AC/DC Machines	3
ELT-118	Commercial/Industrial Wiring I	3
ELT-119	Concepts of Solid State Electronics	5
ELT-121	Concepts of Digital Electronics	5
ELT-206	OSHA Safety Standards	3
ELT-209	Motor Controls I	3
ELT-212	Motor Controls II	3
ELT-231	Intro to Programmable Controllers	3
ELT-232	Programmable Controls II	3
ELT-234	P L C Applications	3
ELT-241	National Electric Code	3

Required General Education (22 credit hours)

Course	Title	Hrs
CIS-149	Introduction to Computers	3
	OR CIS-146 Microcomputer Apps	
ENG-101	English Composition I	3
ENG-130	Technical Report Writing	3
	OR ENG-102 English Composition II	
	OR SPH-106 Fund of Oral Comm	
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MUS-101	Music Appreciation	3
	OR ART-100 Art Appreciation	
ORI-101	Orientation to College	1
PSY-200	General Psychology	3

Total Hours: 76 Credit Hours; 1,920 Contact Hours

Associate in Applied Science Degree Electrical/Instrumentation Technology

Required Technical Courses (54 credit hours)

Course	Title	Hrs
ELT-108	DC Fundamentals	3
ELT-110	Wiring Methods	3
ELT-112	Concepts of Alternating Current	5
ELT-119	Concepts of Solid State Electronics	5
ELT-121	Concepts of Digital Electronics	5
ELT-206	OSHA Safety Standards	3
ELT-209	Motor Controls I	3
ELT-212	Motor Controls II	3
ELT-231	Intro to Prog Logic Controllers	3
ELT-232	Advanced Programmable Controllers	3
ELT-234	P L C Applications	3
ILT-108	Introd to Instruments & Process Ctrl	3
ILT-110	Adv Industrial Process Control Tech	3
ILT-216	Industrial Robotics	3
ILT-217	Industrial Robotics Lab	2
ILT-237	Network Cabling: Copper	2
ILT-238	Network Cabling: Fiber Optics	2

Required General Education (22 credit hours)

CIS-149	Introduction to Computers	3
	OR CIS-146 Microcomputer Apps	
ENG-101	English Composition I	3
ENG-130	Technical Report Writing	3
	OR ENG-102 English Composition II	
	OR SPH-106 Fund of Oral Comm	
MTH-103	Intro to Technical Mathematics	3
MTH-104	Plane Trigonometry	3
MUS-101	Music Appreciation	3
	OR ART-100 Art Appreciation	
ORI-101	Orientation to College	1
PSY-200	General Psychology	3

Total Hours: 76 Credit Hours; 1,920 Contact Hours

**Short Term Certificate
Electrical Technology
Emphasis: Electronics/
Instrumentation/Electrical
Technicians Helper**

Required Technical Courses (25 credit hours)

Course	Title	Hrs
ELT-108	DC Fundamental	3
ELT-110	Wiring Methods	3
ELT-112	Concepts of Alternating Current	5
ELT-114	Residential Wiring Methods	3
ELT-117	AC/DC Machines	3
ELT-119	Concepts of Solid State Electronics	5
ELT-209	Motor Controls 1	3

Required General Education (4 credit hours)

Course	Title	Hrs
CIS-149	Introduction to Computers	3
	OR CIS-146 Microcomputer Apps	
ORI-101	Orientation to College	1

Total Hours: 29 Credit Hours; 880 Contact Hours

Course Descriptions for Electrical Technology (ELT)

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours
ELT-104	DISTRIBUTION SYSTEMS PREREQUISITE: ELT-108 and ELT-109 This course involves the theory, applications, calculations, and connections associated with transformers and power distribution systems commonly used in the electrical field.	2	3	3
ELT-108	DC FUNDAMENTALS PREREQUISITE: None This course provides a study of atomic theory, direct current (DC), properties of conductors and insulators, direct current characteristics of series, parallel, and series parallel circuits. Inductors and capacitors are introduced and their effects on DC circuits are examined. Students are prepared to analyze complex DC circuits, solve for unknown circuits variables with the use of Ohm's Law and to use basic electronic test equipment. This is a CORE course.	1	6	3
ELT-110	WIRING METHODS PREREQUISITE: None This course is a study of various tasks, wiring methods, materials, and associated NEC requirements that students will be required to work with in residential and commercial wiring courses. This is a CORE course.	1	6	3
ELT-112	CONCEPTS OF ALTERNATING CURRENT PREREQUISITE: ELT-108 This course provides an advanced study of alternating current (AC) concepts and application principles. Specific topics include safety, terms and symbols, AC electrical theory, components, circuits, electrical measurement instruments, laws of AC, and methods for constructing and measuring various types of AC circuits. Students gain hands-on experience through laboratory exercises designed to analyze complex circuits, power requirements, faults, phase relationships, and power factors. Emphasis is placed on the use of scientific calculators and the operation of various types of test equipment used to analyze and troubleshoot AC circuits.	3	6	5
ELT-114	RESIDENTIAL WIRING METHODS PREREQUISITE: None This course is a study of residential wiring practices and methods, the NEC requirements and residential blueprint interpretations. This is a CORE course.	2	3	3
ELT-115	RESIDENTIAL WIRING METHODS II PREREQUISITE: ELT-114, ELT-108 and ELT-109 This course is a study of residential wiring practices and methods, the NEC requirements and residential blueprint interpretations. This is a CORE course.	2	3	3
ELT-117	AC/DC MACHINES PREREQUISITE: ELT-108 and ELT-109 This course covers the theory and operation of DC motors single and three phase AC motors and the labs will reinforce this knowledge. Emphasis is placed on the various types of single and three phase motors, wiring diagrams, starting devices, and practical application in the lab. This is a CORE course.	1	6	3
ELT-118	COMMERCIAL/INDUSTRIAL WIRING I PREREQUISITE: ELT-108 and ELT-109 This course focuses on principles and applications of commercial and industrial wiring. Topics include electrical safety practices, an overview of National Electric Code requirements as applied to commercial and industrial wiring, conduit bending, circuit design, pulling cables, transformers, switch gear, and generation principles. This is a CORE course.	1	6	3
ELT-119	CONCEPTS OF SOLID STATE ELECTRONICS PREREQUISITE: ELT-112 This course is an introduction to semiconductor fundamentals and applications to the electronic devices. Course covers the basic operations and applications to include rectifier circuits, transistors, and thyristors. Coverage is given to safety, use, and care with hazardous materials and personal as well as material and environmental considerations. Upon completion students will be able to construct and test for proper operation of various types of solid state devices.	3	6	5

Course #	Course Title	Theory Contact Hours/Wk	Lab Contact Hours/Wk	Credit Hours
ELT-121	CONCEPTS OF DIGITAL ELECTRONICS PREREQUISITE: ELT-112 This course provides instruction in digital electronics. Topics include: number systems and codes, a review of Boolean algebra, logic elements, digital circuits, programmable logic circuits, and memory and computing circuits. This course provides laboratory exercises to analyze, construct, test and troubleshoot digital circuits.	3	6	5
ELT-206	OSHA SAFETY STANDARDS PREREQUISITE: NONE This course provides the student with the knowledge of OSHA safety standards as required by this organization, and as it related to the job site. Emphasis is placed on overall safety practices, construction site safety practices and safety procedures required by Federal/State laws. Upon completion, students should be able to understand the requirements of OSHA as it relates to general and specific construction sites.	3	0	3
ELT-209	MOTOR CONTROLS I PREREQUISITE: ELT-108 and ELT-109 This course covers the use of motor control symbols, magnetic motor starters, running overload protection, push-button stations, sizing of magnetic motor starters and overload protection, and complex ladder diagrams of motor control circuits. Topics include sizing magnetic starters and overload protection, the use of push-button stations, ladder diagrams, and magnetic motor starters in control of electric motors, wye-delta starting, part start winding, resistor starting and electric starting devices. Upon completion, students should be able to understand the operation of motor starters, overload protection, interpret ladder diagrams using push-button stations and understand complex motor control diagrams. This is a CORE course.	1	6	3
ELT-212	MOTOR CONTROLS II PREREQUISITE: ELT-108, ELT-109, ELT-209, ELT-117, and MTH-103 This course covers complex ladder diagrams of motor control circuits and the uses of different motor starting techniques. Topics include wye-delta starting, part start winding, resistor starting and electronic starting devices. Upon completion, the students should be able to understand and interpret the more complex motor control diagrams and understand the different starting techniques of electrical motors.	2	3	3
ELT-231	INTRODUCTION TO PROGRAMMABLE CONTROLLERS PREREQUISITE: ELT-108 and ELT-109 This state-of-the art course includes the fundamental principles of programmable logic controls (PLCs) including hardware and programming. Emphasis is placed on but not limited to the following: hardwiring associated with the PLC, different options available with most PLCs and basic ladder logic programming. Upon completion, students must demonstrate their ability by developing programs, loading programs into real world PLCs and troubleshooting the system if necessary.	2	3	3
ELT-232	ADVANCED PROGRAMMABLE CONTROLLERS PREREQUISITE: ELT-108 and ELT-109 This course includes the advanced principals of PLC's including hardware, programming, and troubleshooting. Emphasis is placed on developing advanced working programs, and troubleshooting hardware and software communication problems. Upon completion, students should be able to demonstrate their ability in developing programs and troubleshooting the system.	2	3	3
ELT-234	PLC APPLICATIONS PREREQUISITE: ELT-108, ELT-109, ELT-209, ELT-117, ELT-231, ELT-232, and MTH-103 This course introduces advanced PLC programming techniques. Topics include tags, parallel processing, program optimization, and advanced math instructions. Emphasis is placed on optimizing PLC functions. Upon completion students will be able utilize advanced instructions to control PLC functions.	2	3	3
ELT-241	NATIONAL ELECTRIC CODE PREREQUISITE: ELT-108 and ELT-109 This course introduces the students to the National Electric Code and text and teaches the student how to find needed information within this manual. Emphasis is placed on locating and interpreting needed information within the NEC code manual. Upon completion, students should be able to locate, with the NEC code requirements for a specific electrical installation.	3	0	3