

# ELECTRONICS AND COMPUTER TECHNOLOGY

The Electronics and Computer Technology Department offers several concentrations in electronics and computer technology that are designed to prepare students for a variety of high-tech job/career opportunities in the fields of engineering and technology; electronics technology; computer technology; telecommunication technology; and related technologies.

## Career Opportunities

Electronics Engineering Technologist, Computer Engineering Technologist, Network Engineering Technologist, Telecommunications Engineering Technologist, Certified Electronics Technician - CET, A+ Certified Computer Technician, N+ Certified Network Technician, Certified Telecommunication Technician, CISCO Certified Network Associate (CCNA), CISCO Certified Network Professional (CCNP), Microsoft Certified Professional (MCP), Microsoft Certified Systems Engineer (MCSE), Networking Cable Installer, Fiber Optics Installer, Microwave/Radar Technician, Laser/Optical Technician, Industrial Electronics Technician, Consumer Electronics Technician, Biomedical Instrument Technician, Audio/Visual Systems Technician, Broadcast Radio and Television, Research and Development, Sales Representative, electronics and computer equipment, Quality Control Technician,

## Faculty

Rubayi, Khalid

## Transfer

Most Electronics and Computer Technology courses transfer as electives or fulfill subject credit requirements. Students in this field sometimes choose to pursue a bachelor's degree in technology fields such as Industrial Technology at California State Polytechnic University, San Luis Obispo, or Engineering Technology at California State Polytechnic University, Pomona. Other students choose to pursue an Engineering degree which requires a more intense curriculum in mathematics, chemistry, and physics.

Campuses that offer Electronics and Computer Technology majors include: CSU - Chico, Fullerton, Long Beach, Pomona and Sacramento.

For the most up-to-date information on these programs and others, visit [assist.org](http://www.assist.org) (<http://www.assist.org>). Please stop by the Transfer Center in Building 23 or make an appointment with a counselor if you have questions.

## Electronics and Computer Technology, AS

**State Control Number:** 07558

**Program Code:** ELCT.AS

**Approved for Federal Financial Aid:** Yes

The Electronics and Computer Technology major requires 18 units from any of the certificates or from any Electronics and Computer Technology coursework. ELCT 138 Cooperative Education Electronics may be used as elective credit, but may not be used to fulfill major requirements.

To earn this degree, complete the major coursework with "C" grades or better and all of the following graduation requirements: 60 minimum degree-applicable units (including a maximum 4 units of activity);

2.0 minimum overall GPA; 12 degree-applicable units through VVC; Information Competency; Global Citizenship; Kinesiology, and the VVC General Education pattern (<https://catalog.vvc.edu/degrees-certificates/vvcge/#vvcge>). Courses may count in one area only, either in the major or in a general education category. Courses counted in one AA/AS major may not be used in another AA/AS major.

## Electronics Engineering Technology: Electronics, AS

**State Control Number:** 07557

**Program Code:** ELTCE.AS

**Approved for Federal Financial Aid:** Yes

To earn this degree, complete the major coursework with "C" grades or better and all of the following graduation requirements: 60 minimum degree-applicable units (including a maximum 4 units of activity); 2.0 minimum overall GPA; 12 degree-applicable units through VVC; Information Competency; Global Citizenship; Kinesiology, and the VVC General Education pattern (<https://catalog.vvc.edu/degrees-certificates/vvcge/#vvcge>). Courses may count in one area only, either in the major or in a general education category. Courses counted in one AA/AS major may not be used in another AA/AS major.

Code	Title	Units
<b>Required Courses</b>		
ELCT 50	A+ Operating Systems Technologies	4.0
ELCT 51		
ELCT 71	Principles of Digital Logic and Circuits	4.0
ELCT 73	Microprocessor Principles	4.0
ELCT 131	DC Circuit Theory and Analysis	4.0
ELCT 132	AC Circuit Theory and Analysis	4.0
ELCT 133	Solid State Devices and Circuits	4.0
ELCT 134	Solid State Circuit Analysis	4.0
<i>Electronics Emphasis</i>		
ELCT 53		
ELCT 54		
<i>Mathematics Sequence</i>		
ELCT 57	Technical Mathematics for Electronics I	3.0
ELCT 58	Technical Mathematics for Electronics II	3.0
ELCT 59	Technical Calculus for Electronics I	3.0
ELCT 60	Technical Calculus for Electronics II	3.0
Students planning to transfer to an Electrical Engineering, BS program should take the following mathematics courses instead of Technical Mathematics and Calculus for Electronics.		
MATH 104	Trigonometry	
MATH 105	College Algebra	
MATH 226	Analytic Geometry and Calculus I	
	or MATH 226H Honors Analytic Geometry and Calculus I	
MATH 227	Analytic Geometry and Calculus II	
	or MATH 227H Honors Analytic Geometry and Calculus II	
<b>Total Units</b>		<b>40</b>

## Electronics and Computer Technology Courses

### ELCT 7 A+ Certification Exam Preparation (2.0 Units)

This course is designed to prepare students for the Computing Technology Industry Association (CompTIA) A+ Certification Test. The course consists of a test-simulation-and-review software program that provides practice tests with realistic questions, a study guide, and reference materials. This course will not apply to the Associate Degree. Lab Hours: 72.0

Transfer: Not transferable

### ELCT 50 A+ Operating Systems Technologies (4.0 Units)

This course is designed to prepare students to take the A+ Operating Systems Technologies Examination. Topics will include coverage of Operating Systems fundamentals for DOS, Windows 9x and Windows 2000; knowledge of installing, configuring and upgrading Windows 9x and Windows 2000; and how to diagnose and troubleshoot common problems relating to Windows 9x and Windows 2000. This course will cover knowledge of network capabilities of Windows and how to connect to networks on the client side.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 57 Technical Mathematics for Electronics I (3.0 Units)

This course is designed to provide a basis for a clear mathematical understanding of the principles of DC electricity and electronics, and their analysis. Covered are algebra, equations, power of 10, units and dimensions, special products and factoring, algebraic fractions, fractional equations, graphs, simultaneous equations, determinants and matrices, exponents and radicals, and quadratic equations.

Lecture Hours: 54.0; Lab Hours: 108.0

Transfer: Not transferable

### ELCT 58 Technical Mathematics for Electronics II (3.0 Units)

This course is designed to provide a basis for a clear mathematical understanding of the principles of AC electricity and electronics and their analysis. Covered are inequalities, series, angles, trig functions, solution of right triangles, trig identities and equations, plane vectors, periodic functions, phasor algebra, and logarithms.

Lecture Hours: 54.0

Transfer: Not transferable

### ELCT 59 Technical Calculus for Electronics I (3.0 Units)

This course is designed for students who are preparing for careers in electronics, electricity, computers, and related technical fields. Topics include: Introduction to Calculus for Electronics, Functions, Rates, Limits, Derivatives, Graphical Application of the Derivative, Differentiation, Trigonometric, Logarithmic and Exponential Functions, First-Order Linear Differential Equation, Maximum, Minimum, and Inflection Points.

Lecture Hours: 54.0

Transfer: Not transferable

### ELCT 60 Technical Calculus for Electronics II (3.0 Units)

This course in technical calculus for electronics continues the study of functions and further operations. Topics include: Trig Functions, Logarithmic and Exponential Functions, Hyperbolic Functions, Partial Derivatives, Integration Techniques, Double Integrals, Infinite series, MacLaurin series, Taylor series, Fourier series, and introduction to Differential Equations.

Lecture Hours: 54.0

Transfer: Not transferable

### ELCT 61 Basic Maintenance of Personal Computers (4.0 Units)

This course is intended for non-technical students, office personnel working in a computer environment, and others within the community who desire to gain hands on experience in servicing, maintaining, and upgrading personal computers (PCs). Satisfies computer industries' A+ certification requirements.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 71 Principles of Digital Logic and Circuits (4.0 Units)

This course will introduce students to digital logic circuits. Students will cover basic concepts in digital electronics, and discrete digital components. Hands-on LAB will cover steps to build, verify and troubleshoot digital circuits with emphasis on practical applications and proper use of test equipment. Topics include binary systems, logic gates, combinational logic, synchronous sequential logic, Flip-Flops, asynchronous sequential logic, registers, counters, memory, and digital integrated circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 73 Microprocessor Principles (4.0 Units)

Introduction to the principles of microprocessor design, topics include microprocessor architecture, bus architecture, memory (R/W Memory, ROM, EPROM, and EEPROM) maps, interfacing devices, assembly language programming techniques, parallel I/O, serial I/O and interrupts. Laboratory projects include emphasis on designing and building microprocessor-based systems and hardware interfacing.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 76 Microprocessor Interfacing and Applications (4.0 Units)

Development of microprocessor based systems for embedded applications. Topics include Interfacing to input/output peripherals such as displays, keypads, sensors, digital-to-analog and analog-to-digital converters, and communication devices among others. Laboratory component is an integral part of this course emphasizing a hands-on approach for students to design, build, and test embedded micro-controller systems.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 78A Network Fundamentals (4.0 Units)

The goal of this course is to introduce students to fundamental networking concepts and technologies. It will assist students in developing the skills necessary to plan and implement small networks across a range of applications. Topics include, OSI and TCP/IP models, different network topologies, IP addressing and sub-netting. Satisfies Cisco Certified Network Associate (CCNA) certification exam requirements.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

### ELCT 78B Routing Protocols and Concepts (4.0 Units)

This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Students with hands-on approach will be able to analyze, configure, verify and troubleshoot routing protocols RIPv1, RIPv2, EIGRP, and OSPF. Satisfies Cisco Certified Network Associate (CCNA) certification exam requirements.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78C LAN Switching and Wireless (4.0 Units)**

This course provides a comprehensive and practical approach to learning the technologies and protocols needed to design and implement a converged switched network. Students will learn how to select network devices for each layer. The course explains how to configure a switch and how to implement Virtual LANs, VTP, and Inter-VLAN routing. It also discusses the implementations of Spanning Tree Protocol. Students will develop the skills necessary to implement a Wireless LAN in a small-to-medium network. Satisfies Cisco Certified Network Associate (CCNA) certification exam requirements

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78D Accessing the WAN (4.0 Units)**

This course discusses the Wide Area Network (WAN) technologies and network services required to gain access outside the Local Area Network (LAN). Students learn in a hands-on approach how to implement and configure different technologies to access the WAN. Topics include, Point-to-Point protocol (PPP), Frame Relay, Network Security, Access Control Lists (ACLs), Virtual Private Networks (VPN), Network Address Translation (NAT), DHCP and IPv6. Satisfies Cisco Certified Network Associates (CCNA) certification exam requirements.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78E Advanced Network Routing (4.0 Units)**

This course is the first of a four course series designed to prepare students towards the Cisco Certified Network Professional (CCNP) Certification. It introduces students to advanced IP address management, scaling IP networks, IP addressing using VLSM, private addressing, and NAT to optimize address utilization. Majority of the course deals with advanced topics in configuring routing protocols (RIP v2, EIGRP, ISIS, multi-area OSPF, and BGP), also covers important topics and techniques for route filtering, route optimization and route redistribution.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78F Implementing Secure Converged Wide-Area Networks (4.0 Units)**

This is the second course of a four course series designed to prepare students for Cisco Certified Network Professional (CCNP) certification. The course will cover advanced topics in Wide Area Network (WAN). Students learn with hands-on approach how to configure and implement different WAN technologies with focus on VPN configuration and securing network access. Topics include teleworker configuration and access, frame-mode MPLS, site-to-site IPSEC VPN, Cisco EZVPN, strategies used to mitigate network attacks, Cisco device hardening and IOS firewall features.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78G Bldg Multilayer Switched Networks (4.0 Units)**

This is the third course of a four course series designed to prepare students for Cisco Certified Network Professional (CCNP) certification. The course will cover advanced topics in building Multilayer Switched Networks. Students learn with hands-on approach how to deploy state-of-the-art campus LANs. Topics include VLANs, Spanning Tree Protocol (STP), VTP, Inter-VLAN Routing, Layer three Switches, Wireless Client Access, Voice over IP (VoIP) Switch Configuration, Redundancy and Fault Tolerance.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78I Fundamentals of Network Security (4.0 Units)**

The curriculum provides students with both the technical knowledge and skill experience through extensive hands-on experience needed to prepare for entry-level security specialist careers. The curriculum aims to provide students with hands-on experience with Cisco routers, switches, PIX, ASA security appliance and to develop in-depth understanding of network security principles and tools such as: protocol sniffers/analyzers, Cisco IOS Software, and Cisco VPN client.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 78K Voice Over IP (VoIP) Foundations (4.0 Units)**

Practical hands-on approach to Voice over IP (VoIP) implementation. Topics include Internet Protocol carries a VoIP packet, configuring DHCP and DNS for supporting IP telephony, Real-Time Transport Protocol, Session Initiation Protocol, call set up, Instant Messaging, the H.323 protocol suite, gatekeepers, gateways, implementing QoS, jitter, latency, and packet loss impact to VoIP networks, troubleshooting RTP, MGCP, SIP, and H.323, and security considerations. Lab covers Cisco router, Switch, IP Phones, and CallManager Configuration.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Not transferable

**ELCT 85 Fiber Optics (3.0 Units)**

This hands-on self-paced course will provide students with the skills required to inspect, install and test fiber optic connectors, how to use the epoxy polish method, identify damage to cables and associated causes, test fiber optic cable for losses, fiber cable splicing, optical performance, install, configure, and troubleshoot fiber optic communications, switches and systems. Students will learn the principals of operation for an optical time domain reflectometer (OTDR) and how to use a light source/power meter.

Lab Hours: 108.0

Transfer: Not transferable

**ELCT 87 Industrial Control Sys, Devices and Ckts (3.0 Units)**

This course is designed to provide the student an opportunity to study a wide range of applications of electronics found in industrial automation and robotics. Topics include: operational amplifiers, linear integrated circuits, generators and motors, control devices and circuits, transducers, programmable logic controllers (PLCs), PLC functions, ladder logic, programming and applications.

Lab Hours: 108.0

Transfer: Not transferable

**ELCT 110 Electronics and Computer Technology Fundamentals (3.0 Units)**

This course is designed to introduce students to a wide range of topics in electronics and computer technologies. As an introduction course, it will demonstrate to students in a simplified and hands-on approach how modern electronics and computer technologies operate and are used in their daily lives.

Lecture Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 131 DC Circuit Theory and Analysis (4.0 Units)**

Introduction to DC circuits analysis, a theoretical and practical hands-on approach to DC fundamentals. Topics include Ohm's Law, Series, Parallel and Series-Parallel Circuits, Network Theorems, Methods of Analysis, Equivalent Circuits, Capacitive and Inductive Circuits, Timing Circuits, Measuring Instruments, Magnetism and Magnetic Circuits. A laboratory component is an integral part of this course emphasizing a hands-on approach for students to use different test instruments and software tools to design, build, test, and analyze DC circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to both UC/CSU

**ELCT 132 AC Circuit Theory and Analysis (4.0 Units)**

Introduction to AC circuits analysis, a theoretical and practical hands-on approach to AC fundamentals. Topics include AC waveform analysis, Inductive and Capacitive Circuits, Impedance, Power in AC Circuits, AC Series-Parallel Circuits Design, Methods of AC Analysis, AC Network theorems, Resonance, and Filters. Lab component is an integral part of course, emphasizing hands-on approach using different test instruments and software applications to design, build, test, and analyze AC circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to both UC/CSU

**ELCT 133 Solid State Devices and Circuits (4.0 Units)**

Introduction to Solid State Devices; topics include Semiconductor Diodes, Bipolar Transistor Theory, DC Biasing of Bipolar Junction Transistors, Field-Effect Transistor Theory, FET Biasing, BJT and FET Small Signal Analysis, Large Signal Amplifiers, Introduction to Operational Amplifiers, Linear Integrated Circuit Regulators, Feedback Amplifiers and Oscillator Circuits. Laboratory component is an integral part of this course emphasizing a hands-on approach for students to use different test instruments and software tools to design, build, test, and analyze Solid State circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 134 Solid State Circuit Analysis (4.0 Units)**

Introduction to Operational Amplifiers and Linear Integrated Circuits, topics include Differential Amplifiers, Operational Amplifiers, Op-Amp with Negative Feedback, Frequency Response of an OP-Amp, Active Filters and Oscillators, Comparators, General Linear Applications, and Specialized Applications. Laboratory component is an integral part of this course emphasizing a hands-on approach for students to use different test instruments and software tools to design, build, test, and analyze various Op-Amps and Linear Integrated circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 138 Cooperative Education Electronics (1-8 Units)**

Cooperative Education teaches students how to use work experience for personal development, training, and career planning. Through the combined efforts of college faculty, students, and local employers, students are assisted in acquiring desirable work habits as well as knowledge, skills, and abilities at their worksite.

Transfer: Transfers to CSU only

**ELCT 201 Digital Logic Design Fundamentals (4.0 Units)**

Binary systems and Boolean Algebra, Karnaugh Maps, Logic Gates, Combinational Logic, Synchronous Sequential Logic, Flip-Flops, Asynchronous Sequential Logic, Registers, Counters, Memory and Programmable Logic, Field Programmable Gate Array (FPGA), Introduction to Hardware Description Languages (HDL) using Verilog (VHDL), and digital integrated circuits.

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 202 Computer Methods for Engineers (4.0 Units)**

This course is an introduction to methods and techniques for solving engineering problems using numerical-analysis computer-application programs, technical computing and visualization using MATLAB software. The course is structured to allow students to have a thorough hands-on experience with examples and exercises applied to a wide variety of practical engineering problems.

Prerequisite(s): MATH 227 or MATH 227H, Minimum grade C

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 210 Engineering Circuit Analysis I (4.0 Units)**

Introduction to engineering circuit analysis, topics include Ohm's Law, Series, Parallel and Series-Parallel Circuits, Network Theorems, Methods of Analysis, Mesh Equations, Equivalent Circuits, Capacitive and Inductive Circuits, First-Order Circuits, Timing Circuits, Measuring Instruments, Magnetism and Magnetic Circuits, Introduction to Electromagnetic radiation and Electric Machinery. Laboratory experiments and the use of Computer Aided Circuit Analysis software (MultiSim and MATLAB) is an integral part of the course to supplement classroom lectures.

Prerequisite(s): MATH 226 or MATH 226H, Minimum grade C

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 211 Engineering Circuit Analysis II (4.0 Units)**

Topics include analysis of RLC passive networks in response to single and multiple sinusoidal, ramp, and pulse sources, the Laplace Transform, and Fourier analysis.

Prerequisite(s): ELCT 210, Minimum grade C

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only

**ELCT 212 Engineering Circuit Analysis Fundamentals (4.0 Units)**

Topics include Ohm's Law, Network Theorems, Methods of Analysis, Mesh Equations, Superposition, Equivalent Circuits, First-Order and Second-Order RLC Circuits, Timing Circuits, Methods of AC analysis, Sinusoidal Steady-State Analysis, The Laplace Transform, Fourier analysis, Two-Port Networks, Resonance and Passive Filters. Nonlinear Circuit Analysis including Diodes. Laboratory experiments and the use of Computer Aided Circuit Analysis software such as (MultiSim and MATLAB) is an integral part of the course to supplement classroom lectures.

Prerequisite(s): PHYS 203, Minimum grade C

Lecture Hours: 54.0; Lab Hours: 54.0

Transfer: Transfers to CSU only