

ELECTRICITY, ELECTRONICS, AND TECHNICAL CALCULATIONS

The Electricity/Electronics curriculum is designed to provide entry-level job training in this broad and expanding field. These classes lead to trainee positions in maintenance, installation, field service, networking, and apprenticeship in the area of specialization. Students who seek a Certificate or an Associate of Science Degree in the fields of:

1. Electronics Technology,
2. Communication Engineering Technology,
3. Computer Engineering Technology,
4. Electric Power Technology, or
5. Avionics Technology,

will complete a series of Electronics Technology courses common to electricity, communications, and computers and then complete the appropriate area of specialization. A certificate is also available in the General Electrician Certification Program.

Students planning to transfer to a four-year institution and major in electronics should consult with a counselor regarding the transfer process and lower division requirements.

Contact Information

Division: Applied Technology, Transportation, and Culinary Arts (T - 108)

Division Phone Number: (909) 384-4451

Faculty Chair: Tarif (Terry) Halabi (thalabi@sbccd.edu), M.S.E.E.

- Avionics Technology Associate of Science Degree (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/avionics-technology-as-degree/>)
- Communication Engineering Technology Associate of Science Degree (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/communication-engineering-technology-as-degree/>)
- Computer Engineering Technology Associate of Science Degree (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/computer-engineering-technology-as-degree/>)
- Electric Power Technology Associate of Science Degree (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/electric-power-technology-as-degree/>)
- Electronics Technology Associate of Science Degree (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/electronics-technology-as-degree/>)
- Avionics Technology Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/avionics-technology-certificate-achievement/>)

- Communication Engineering Technology Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/communication-engineering-technology-certificate-achievement/>)
- Computer Engineering Technology Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/computer-engineering-technology-certificate-achievement/>)
- Electric Power Technology Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/electric-power-technology-certificate-achievement/>)
- Electronics Technology Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/electronics-technology-certificate-achievement/>)
- General Electrician Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/general-electrician-certificate-achievement/>)
- Green Technician Certificate of Career Preparation (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/green-technician-certificate-achievement/>)
- Industrial Automation Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/industrial-automation-certificate-achievement/>)
- Smart Systems Automation Technology Certificate of Completion (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/smart-systems-automation-technology-certificate-completion/>)
- Zero Net Energy Certificate of Achievement (<http://catalog.valleycollege.edu/degree-certificate-program-index/electricity-electronics-technical-calculations/zero-net-energy-certificate-achievement/>)

ELEC 021 3 Units

Blueprint Reading for Building Energy Systems

Lecture: 54 contact hours

Advisory: TECALC 087

This course is a study of basic information for reading blueprints and construction drawings. It is designed for those who must assimilate information found in working drawings and specifications.

Associate Degree Applicable

ELEC 050 4 Units

Zero Net Energy Building Science

Lecture: 72 contact hours

Zero Net Energy (ZNE) Building Science includes an overview of many progressive measures that improve the energy performance of buildings. Studies focus on architectural design of building, construction methodology, green HVAC systems, renewable energy systems and the terminology used in the ZNE Industry. A survey of projects, policies and programs driving ZNE performance in residential and non-residential buildings will be studied.

Associate Degree Applicable

ELEC 091 3 Units**Fundamentals of Solar Energy****Lecture:** 54 contact hours**Prerequisite:** ELECTR 230

This course is designed for students interested in a career in the solar industry. The fundamental principles and functions of photovoltaic industry will be introduced along with the planning, installation and maintenance of all necessary components for a photovoltaic system. The transmission and distribution of electric power will be reviewed, and basic concepts of electricity, identification, functions and operations of components will be surveyed.

Associate Degree Applicable**ELEC 101 3 Units****Supply Chain Technology****Lecture:** 36 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 110 and ELECTR 111

This course is an industrial technology overview covering the basic knowledge and skills needed for supply chain technicians to successfully work in automated factories, warehouses, and distribution centers. Introduction to the troubleshooting and maintenance of complex electromechanical systems is a major focus of this class.

Associate Degree Applicable**Transfers to CSU only****ELEC 215C 4 Units****Electrical Control of Hydraulic-Pneumatic Systems****Lecture:** 36 contact hours**Lab:** 108 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

This course introduces hydraulic/pneumatic fundamentals, principle of electrical control of hydraulic/pneumatic systems, electrical concepts of ladder diagrams, functional systems of electrical/hydraulic/pneumatic sequencing of actuators, industrial applications, industrial-type hydroelectric and electro pneumatic circuits, and troubleshooting electrically controlled hydraulic/pneumatic systems.

Associate Degree Applicable**Transfers to CSU only****ELEC 216C 4 Units****Introduction to Industrial Electricity****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 110 and ELECTR 111

This course covers the study of electrical power transmission, the National Electrical Code, electrical blueprints, residential and commercial wiring.

Associate Degree Applicable**Transfers to CSU only****ELEC 217C 4 Units****Industrial Electricity****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

This course covers the study of DC motors, single and polyphase AC motors, and the necessary controls and measuring equipment used for industrial circuit protection and switching equipment.

Associate Degree Applicable**Transfers to CSU only****ELEC 218C 4 Units****Controlling Industrial Electricity****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

This course covers the study of DC, AC, and polyphase motor operation, mechanical and programmable machine controls, relays and programmable logic controllers (PLCs), ladder logic diagrams and the communication network linking the programmer, the controller, the laptop computer and the machine.

Associate Degree Applicable**Transfers to CSU only****ELEC 219C 4 Units****Industrial Electronic Systems Controls II****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELEC 218C

This course examines system application of industrial electronic systems (PLC) including industrial production and processes, automation, and programmable motor controllers. Emphasis is on programmable logic controllers.

Associate Degree Applicable**Transfers to CSU only****ELECTR 098 1-4 Units****Electronics Work Experience****WRKEX:** 300 contact hours

Supervised training, in the form of on the job employment that will enhance the student's knowledge in the selected field of study. The student's major and job must match. For paid work, 75 hours = 1 unit; for volunteer work, 60 hours = 1 unit. Students may earn a total of 16 units toward graduation in Work Experience 098 courses. See department for specific guidelines.

Associate Degree Applicable**ELECTR 110 3 Units****Direct Current Circuit Analysis****Lecture:** 54 contact hours**Corequisite:** ELECTR 111

This is a comprehensive course in direct current circuit analysis including Ohm's law, series and parallel circuit analysis, voltage and current dividers, DC meters, Kirchhoff's laws, magnetic circuits, and network theorems.

Associate Degree Applicable**Transfers to both UC/CSU****ELECTR 111 1 Unit****Direct Current Circuit Laboratory****Lab:** 54 contact hours**Corequisite:** ELECTR 110

This course is the laboratory complement to ELECTR 110 including experiments reinforcing the theory of electricity and the necessary technical skills.

Associate Degree Applicable**Transfers to both UC/CSU**

ELECTR 115 3 Units**Alternating Current Circuit Analysis****Lecture:** 54 contact hours**Prerequisite:** ELECTR 110 and ELECTR 111**Corequisite:** ELECTR 116

This course is an in-depth analysis of alternating current circuits to include AC generation and transformation, inductance and inductive circuits, capacitance and capacitive circuits, time constants, rectangular and polar notation, AC circuit analysis, resonance, and filters.

Associate Degree Applicable**Transfers to both UC/CSU****ELECTR 116 1 Unit****Alternating Current Circuit Laboratory****Lab:** 54 contact hours**Prerequisite:** ELECTR 110 and ELECTR 111**Corequisite:** ELECTR 115

This course is the laboratory complement to ELECTR 115 including skill training in reading and interpreting measurements on an oscilloscope, using QT boards, function generators, and other test equipment.

Associate Degree Applicable**Transfers to both UC/CSU****ELECTR 155 3 Units****Electronic Drawing and Assembly****Lecture:** 36 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 110

This course covers electronic schematic capture, simulation, export to printed circuit board design, layout, and auto-routing software. It includes basic Computer Aided Design (CAD) drafting, block diagrams, library component templates, and printed circuit board (PCB) design, fabrication, and assembly, using with through-hole and surface-mount technology and devices (SMT and SMD).

Associate Degree Applicable**Transfers to CSU only****ELECTR 220C 3 Units****F.C.C. Rules and Regulations****Lecture:** 54 contact hours

This course is a review of the requirements and questions for the General Radiotelephone Operator's License offered by the Federal Communications Commission.

Associate Degree Applicable**Transfers to CSU only****ELECTR 230 3 Units****Semiconductor Devices****Lecture:** 54 contact hours**Prerequisite:** ELECTR 110

This course is a study of semiconductor devices including the chemistry and physics of the structure of the atom and the operation of semiconductor devices based on energy level analysis.

Associate Degree Applicable**Transfers to CSU only****ELECTR 235 4 Units****Solid State Circuit Analysis****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 230

This course covers an analysis of discrete solid-state circuits and their design including diodes, circuit configurations, amplifiers and amplification, biasing techniques, feedback principles, FETs, photo devices, and evaluation of designed circuits.

Associate Degree Applicable**Transfers to CSU only****ELECTR 250C 4 Units****Radio Transmitters, Receivers and Antennas****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

In this course, students explore topics of electronic communications, such as the electromagnetic frequency spectrum, frequency bands, analog and digital modulation, digital data, antennas, transmission lines and loads, government services and fiber optics. Exercises include diagramming modern transmitter and receiver components, plotting impedances, and making line and load conversions.

Associate Degree Applicable**Transfers to CSU only****ELECTR 255C 4 Units****Telephone and Data Networking****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

This course includes telephone topology with emphasis on the Open System Interconnection (OSI) model, telephony color code, tools, patch panels, phone wiring and installation, voice and data block wiring, installation, and programming/ troubleshooting a digital key system and network.

Associate Degree Applicable**Transfers to CSU only****ELECTR 257C 4 Units****Navigation and Communication Systems****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 250C

This course covers the bench test, installation and ramp test of transmitter and receiver systems and their operating principles. Systems include Auto Direction Finder, Very High Frequency Omnidirectional Range, LORAN-C, Omega, INS, DME, ILS, VHF communication, HF communication, FM transceivers and transponder.

Associate Degree Applicable**Transfers to CSU only****ELECTR 265 4 Units****Digital Logic Design****Lecture:** 54 contact hours**Lab:** 54 contact hours

This course covers combinational logic utilizing Boolean algebra and the binary numbering system. Topics include Karnaugh maps, truth tables, coding, switching circuits, converters, logic circuit elements, timers, digital-to-analog and analog-to-digital conversions, decoders, multiplexers, demultiplexers, and displays.

Associate Degree Applicable**Transfers to CSU only**

ELECTR 266 4 Units**Microprocessor Technology With Assembly Language****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 265

This course covers the fundamental principles of microprocessors and microcontrollers. The architecture of the 8051 series microcontroller is highlighted along with its' operation and applications in embedded systems. Students make use of assembly language and C language to interface with both analog and digital circuitry. Software simulation tools and microcontroller trainer boards are used in lab exercises and a final project.

Associate Degree Applicable**Transfers to CSU only****ELECTR 270 4 Units****Linear Integrated Circuit Analysis****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 115 and ELECTR 116

This course is a review of bipolar transistor fundamentals and differential amplifiers with emphasis on inner connections and circuit designs using integrated circuit operational amplifiers, phase-lock loops, and current differentiating amplifiers. Includes breadboarding and evaluation of various types of active linear and pulse circuits involving operational amplifiers and phase-lock loops.

Associate Degree Applicable**Transfers to CSU only****ELECTR 280C 4 Units****Computer Operation and Maintenance****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 266

This course provides a working knowledge of the principles and analysis techniques applicable to computer operations and maintenance. It includes the theory and experience necessary to understand and analyze computer circuitry as needed for entry-level work in the computer and electronics industry.

Associate Degree Applicable**Transfers to CSU only****ELECTR 290C 4 Units****Industrial Computers and Robotics Maintenance****Lecture:** 54 contact hours**Lab:** 54 contact hours**Prerequisite:** ELECTR 266

This course is a comprehensive study of computers and robots used in industry. Including diagnostics and programming for controlling robots, machines and medical equipment.

Associate Degree Applicable**Transfers to CSU only****ELECTR 600 Noncredit****Preparation for DC Circuit Certification****Lecture:** 54 contact hours

This noncredit electronics technology course prepares students with the specific skills and knowledge in the field of Direct Current (DC) processes and circuits. This course prepares students to take the DC Basics Certification Exam with the Electronics Technicians Association (ETA).

ELECTR 601 Noncredit**Preparation for AC Basics Certification****Lecture:** 54 contact hours

This noncredit electronics technology course prepares students with the specific skills and knowledge in the field of AC circuits. This course prepares students to take the AC Basics Certification Exam with the Electronics Technicians Association (ETA).

ELECTR 602 Noncredit**Preparation for Analog Electronics Certification****Lecture:** 108 contact hours

This noncredit electronics technology course prepares students with the specific skills and knowledge in the field of analog processes and circuits. This course prepares students to take the Analog Electronics Certification Exam with Electronics Technicians Association (ETA).

ELECTR 603 Noncredit**Preparation for Digital Basics Certification****Lecture:** 54 contact hours

This noncredit electronics technology course prepares students with the specific skills and knowledge in the field of digital processes and circuits. This course prepares students to take the Digital Basics Certification Exam with the Electronics Technicians Association (ETA).

ELECTR 604 Noncredit**Preparation for Comprehensive Electronics Certification****Lecture:** 54 contact hours

This noncredit electronics technology course prepares students with the specific skills and knowledge in the field of comprehensive knowledge of motors, generators, control circuits, circuit protection, and power distribution. This course prepares students to take the Comprehensive Electronics Certification with the Electronics Technicians Association (ETA).

ELECTR 620 Noncredit**Introduction to Computer Networking****Lecture:** 54 contact hours**Lab:** 54 contact hours

This noncredit electronics technology course prepares students to take the ETA (Electronics Technicians Association International) STS-CN industry certification. The course covers wire and wireless local area network basics, Internet/VoIP services and security, hardware and software installation, and cabling distribution.

ELECTR 621 Noncredit**Security, Alarm, and Surveillance Systems****Lecture:** 54 contact hours**Lab:** 54 contact hours

This noncredit electronics technology course prepares students to take the ETA (Electronics Technicians Association International) STS-SS industry certification. The course covers closed-circuit television (CCTV) system, security and fire alarm system, Voice-over-Internet Protocol (VoIP), security cameras, smart locks, and smart access control.

ELECTR 622 Noncredit**Smart Environmental Controls****Lecture:** 54 contact hours**Lab:** 54 contact hours

This noncredit electronics technology course prepares students to take the ETA (Electronics Technicians Association International) STS-EC industry certification. The course covers smart lighting, smart thermostats, smart plugs and switches, smart HVAC, and carbon monoxide and smoke detectors, and other miscellaneous smart devices.

ELECTR 623 Noncredit**Audio-Visual Entertainment Systems****Lecture:** 54 contact hours**Lab:** 54 contact hours

This noncredit course prepares students to take the ETA (Electronics Technicians Association International) STS-AV industry certification. The course covers smart televisions and projectors, HD, UHD, LED, and OLED television technologies, wireless smart speakers, Wi-Fi screencasting, audio and HD cabling, amplifiers and receivers, surround sound speaker systems and connectors, rackmounts, and other accessories.

TECALC 087 4 Units**Technical Calculations****Lecture:** 72 contact hours

This course covers practical use and applications of technical calculations on topics such as electrical measurements, temperature, volume, weight, and positioning including the number line, working with dedicated formula, applied problems, geometric principles, graphs, right triangles, coordinate systems, and scientific notation.

Associate Degree Applicable