Electronics

EL 104 Introduction to Robotics and Mechatronics
3.0 units
Acceptable for credit: Transfer CSU
An introduction to robotic control applications. Basic electronics including digital, analog, and microcontroller devices, sensors and transducers, and actuators will be emphasized for automation control. Topics include Basic, Assembly and C language programming for robotic control; interfacing of indicators, switches, sensors and transducers; controlling motion and motors; monitoring and measurement of rotation; measuring light, temperature and conductance; application of navigation and measurement techniques; remote control applications; mechanical systems; and the control of frequency and sound. This course is not open to students who are enrolled in or have received credit for CEL 104 or ET 104. (Fall, Spring) (Letter Grade Only)

EL 105 PC Preventive Maintenance and Upgrading
3.0 units
Acceptable for credit: Transfer CSU
Necessary skills and information needed to make an informed purchase, maintain, upgrade, and evaluate personal computer systems. The student will receive hands-on instruction for performing basic preventive maintenance and the installation of simple upgrades such as adding RAM, installing hard drives, sound cards, etc. Included is the study of soldering techniques, electronic part identification, and safety and system operation. Emphasis will be placed on the student's ability to keep personal computers running at their best performance levels. (Fall, Spring) (Letter Grade Only)

EL 106 Networking Essentials 1
3.0 units
Acceptable for credit: Transfer CSU
Advisories: EL 105 - PC Preventive Maintenance and Upgrading ; and EL 125 - Digital Devices and Circuits
First course in a series designed to provide students with knowledge of and laboratory experiences with current and emerging computer networking technology. Focus will be on LANs, WANs, OSI models, IP addressing, cabling, CompTIA Network +, and network standards; the theory behind the various kinds of network architectures and data transmission methods, and the use of decision-making and problem-solving techniques in applying science, mathematics, and communication concepts to solve networking problems. Instruction and training are provided in the proper care, maintenance, and use of networking software, tools, and equipment. Emphasis will be placed on the Cisco System Certification. Not open to students who have received credit for CS 106. (Fall, Spring) (Letter Grade or Pass/No Pass)

EL 107 Networking Essentials 2
3.0 units
Acceptable for credit: Transfer CSU
Prerequisite: EL 106 - Networking Essentials 1
Second course in a series designed to provide students with knowledge of and laboratory experiences with current and emerging computer networking technology. Focus will be on LANs, WANs, OSI models, IP addressing and router programming; and the theory behind the various kinds of network architectures and data transmission methods including network troubleshooting. Emphasis will be placed on the Cisco System Certification. This course is not open to students who have received credit for CS 107. (Fall, Spring) (Letter Grade or Pass/No Pass)

EL 108 Networking Essentials 3
2.0 units
Acceptable for credit: Transfer CSU
Prerequisite: EL 106 - Networking Essentials 1 ; or EL 107 - Networking Essentials 2
Third course in a series designed to provide students with knowledge of and laboratory experiences with current and emerging computer networking technology. Focus will be on LANs, WANs, OSI models, IP addressing and router programming; and the theory behind the various kinds of network architectures and data transmission methods. Emphasis will be placed on the Cisco System Certification. This course is not open to students who are enrolled in or have received credit for CS 108. (Fall, Spring) (Letter Grade or Pass/No Pass)

EL 109 Networking Essentials 4
2.0 units
Acceptable for credit: Transfer CSU
Prerequisite: EL 108 - Networking Essentials 3 ; or EL 106 - Networking Essentials 1 ; or EL 107 - Networking Essentials 2
The final course in a series designed to provide students with knowledge of and laboratory experiences with current and emerging computer networking technology. Focus will be on LANs, WANs, OSI models, IP addressing and router programming; and the theory behind the various kinds of network architectures and data transmission methods. Emphasis will be placed on the Cisco System Certification. This course is not open to students who are enrolled in or have received credit for CS 109. (Fall, Spring) (Letter Grade or Pass/No Pass)

EL 118 Fundamentals of DC and AC Circuits Analysis
3.0 units
Acceptable for credit: Transfer CSU
Corequisite: EL 119 - Fundamentals of DC and AC Circuits Analysis Laboratory
An introductory study of the nature of electricity; the processes employed in the analysis and documentation of DC and AC electric circuits, and the use of basic electronics testing instruments. Topics include: current voltage, resistance, power, reactance, admittance, resonance, Ohm's law, series parallel and bridge resistive and reactive circuits, Kirchhoff's voltage and current laws, loading effects of meters and supplies, capacitators, inductors, filters, RC and RL time constants, applications of Kirchhoff laws to multiple source series-parallel circuits, complex numbers, and network theorems. (Fall, Spring) (Letter Grade Only)

EL 119 Fundamentals of DC and AC Circuits Analysis Laboratory
2.0 units
Acceptable for credit: Transfer CSU
Corequisite: EL 118 - Fundamentals of DC and AC Circuits Analysis
Provides the student practical experience for the comprehension of DC and AC electrical concepts introduced in EL 118 (Fundamentals of Circuit Analysis) and also presents the proper use of electronic test instrumentation for the measurement of circuit parameters. (Fall, Spring) (Letter Grade Only)

EL 122 Electronic Devices and Circuits
3.0 units
Acceptable for credit: Transfer CSU
Advisories: Concurrent enrollment in; EL 123 - Electronic Devices and Circuits Laboratory
Prerequisite: EL 118 - Fundamentals of DC and AC Circuits Analysis ; and EL 119 - Fundamentals of DC and AC Circuits Analysis Laboratory
Introductory study of semiconductor devices and systems. A detailed analysis of diodes; bipolar junction translators and field-effect transistors; biasing techniques, active circuits, thyristors and optoelectronic components and linear integrated circuits. (Fall) (Letter Grade Only)

EL 123 Electronic Devices and Circuits Laboratory
2.0 units
Acceptable for credit: Transfer CSU
Advisories: Completion of or concurrent enrollment in EL 122
Prerequisite: EL 118 - Fundamentals of DC and AC Circuits Analysis ; and EL 119 - Fundamentals of DC and AC Circuits Analysis Laboratory
Provides the opportunity for the student to apply theoretical semiconductor concepts in a laboratory environment. Major areas of emphasis include diodes, bipolar junction transistors, field-effect transistors, thyristers, optoelectronic devices, and linear integrated circuits. (Fall) (Letter Grade Only)

EL 125 Digital Devices and Circuits
3.0 units
Acceptable for credit: Transfer CSU
Prerequisite: EL 118 - Fundamentals of DC and AC Circuits Analysis ; and EL 119 - Fundamentals of DC and AC Circuits Analysis Laboratory
Study of modern logic devices, circuits and design techniques emphasizing logic families, implementation of devices, combinational and sequential logic circuits, number systems and codes, A/D and D/A conversion, ALU's, digital computer math techniques, memories, system design and troubleshooting practices. (Letter Grade Only)

EL 126 Digital Devices and Circuits Lab
2.0 units
Acceptable for credit: Transfer CSU
Advisories: Completion of or concurrent enrollment in EL 125

Prerequisite: EL 118 - Fundamentals of DC and AC Circuits Analysis ; and EL 119 - Fundamentals of DC and AC Circuits Analysis Laboratory
Digital electronics laboratory designed to parallel Digital Devices and Circuits (EL 125). Emphasizes device operation in circuits and networks and the proper use of standard digital logic test instruments used in the process of troubleshooting and verifying proper circuit operations. (Fall, Spring) (Letter Grade Only)

EL 128 Introduction to Renewable Energy
3.0 units
Acceptable for credit: Transfer CSU
Prerequisite: CEL 104 - Introduction to Robotics and Mechatronics ; or ET 104 or EL 104
A study of the principles behind energy generation and conversion that can be applied to modern electrical, mechanical, and chemical devices that use or produce power. Special emphasis will be given to the study of electricity as a renewable energy source. This course is not open to students who are enrolled in or have received credit for CEL 128 or ET 128. (Letter Grade Only)

EL 131 Programmable Logic Controllers and Control Design
3.0 units
Acceptable for credit: Transfer CSU
Prerequisite: EL 125 - Digital Devices and Circuits
A study of the purpose and operating features of a programmable logic controller (PLC). Topics include PLC terminology, architecture, input/output modules, memory, commands for internal relays, on/off timers, up/down counters, use of subroutines, program control, and math instructions. Relay schematics, ladder logic diagrams, and programming of logic controllers are emphasized. Sensing devices and time-driven process sequences will be studied and integrated into control systems. This course is not open to students who are enrolled in or have received credit for CEL 131 or ET 131. (Letter Grade Only)

EL 133 Mechatronic Systems 1
3.0 units
Acceptable for credit: Transfer CSU
Prerequisite: CEL 104 - Introduction to Robotics and Mechatronics or EL 104 or ET 104
This is a hands-on mechatronic systems course that focuses on the electromechanical concepts (mechanics, electronic, and programming) of automated systems. Emphasis is placed on how industrial grade sensors and transducers function and upon how they are interfaced into control systems. Study topics include: transducers and sensors for light, heat, motion, pressure, and position control; switching devices; input and output signal conditioning; continuous, closed-loop, and proportional integral derivative process control; and safety. This course is not open to students who have received credit for, or are enrolled in ET 133 or CEL 133. (Letter Grade Only)

EL 135 Electronic Measurement and Instrumentation
3.0 units
Acceptable for credit: Transfer CSU
Advisories: Concurrent enrollment in EL 136 is recommended

Prerequisite: EL 122 - Electronic Devices and Circuits ; and EL 123 - Electronic Devices and Circuits Laboratory ; and EL 125 - Digital Devices and Circuits ; and EL 126 - Digital Devices and Circuits Lab

Designed to familiarize students with operating principles and characteristics of basic electronic testing equipment as well as advanced specialized measuring instruments. Methods of operation and calibration of these devices are covered including an overview of Automated Test Equipment (ATE) systems. (Fall) (Letter Grade Only)

EL 136 Electronics Measurement and Instrumentation Laboratory
2.0 units

Acceptable for credit: Transfer CSU
Corequisite: EL 135 - Electronic Measurement and Instrumentation
Prerequisite: EL 122 - Electronic Devices and Circuits ; and EL 123 - Electronic Devices and Circuits Laboratory ; and EL 125 - Digital Devices and Circuits ; and EL 126 - Digital Devices and Circuits Lab

Provides hands-on laboratory experience for the study and construction of electronic testing instruments. The student is introduced to many different types of testing equipment currently used by the electronics industry. (Fall) (Letter Grade Only)

EL 139 Electrical Power, Motors, and Controls
3.0 units

Acceptable for credit: Transfer CSU
Prerequisite: EL 122 - Electronic Devices and Circuits ; and EL 125 - Digital Devices and Circuits

A study of electronics, signal communication and power technology that support efficient manufacturing processes for various industries. Topics include motors, their drives and controls, power electronics, PLCs, and communications networks used to monitor industrial processes. This course is not open to students who are enrolled in or have received credit for CEL 139 or ET 139. (Letter Grade Only)

EL 146 Electronic Product Design, Fabrication and Documentation
2.0 units

Acceptable for credit: Transfer CSU

A study of product fabrication emphasizing mechatronic applications and designs. Topics include the design process; CADD drawings, schematics, diagrams, and support graphic requirements; printed circuit board layout and population techniques; technical writing; project documentation requirements; surface mount technologies; prototyping; printed circuit board testing, troubleshooting, and final documentation emphasizing hands-on experiences. The use of industry standard computer aided drafting and support software will be studied and utilized in all phases of documentation through camera ready artwork. (Letter Grade Only)

EL 162 Fluid Power And Control
2.0 units

Acceptable for credit: Transfer CSU

An introduction to the generation, control and basic applications of hydraulics and pneumatics force and motion systems. Topics include safety, properties of and forces in liquids, pumps, motors, valves, reservoirs, strainers, filters, accumulators, basic diagramming, system design and troubleshooting. This course is not open to students who are enrolled in or have received credit for CEL 162 or ET 162. (Letter Grade Only)

EL 189 Independent Projects in Electronics
1.0 - 3.0 units

Acceptable for credit: Transfer CSU

Courses for students capable of independent work who demonstrate the need or desire for additional study beyond the regular curriculum. Enrollment allows students to pursue activities such as directed field experience, research, or development of skills and competencies under faculty advisement and supervision. Independent projects may be earned in most disciplines. Students wishing to enroll in Independent Projects should contact the appropriate instructor identified in the class schedule. If the project proposed is acceptable to that instructor, a contract will be developed. All contracts for these classes must be completed and approved by the appropriate dean before the last day of the enrollment. Units are awarded depending upon satisfactory performance and the amount of time committed by the student to the course. Allowable units vary according to discipline, and are based on the following formula: 1 unit - 48 hours per semester 2 units - 96 hours per semester 3 units - 144 hours per semester (Letter Grade Only)

EL 320 A+ Certification
2.5 units

Acceptable for credit: D - Credit - Degree Applicable
Advisories: EL 105 - PC Preventive Maintenance and Upgrading
Computer repair and maintenance with a focus on preparations required for achieving the industry standard CompTIA A+ Certification. The hands-on study includes the A+ Core Test Domains and the Windows/DOS Test Domains. This course is not open to students who have received credit for CS 320. (Letter Grade Only)

EL 332 Wireless Network Administrator
3.0 units

Acceptable for credit: D - Credit - Degree Applicable

A study of the basic concepts and technologies of wireless data networking. Includes basic RF theory, WiFi infrastructure, link budget math, troubleshooting techniques, site survey skills, and security measures. Prepares students to take the CWNA Certification Exam at Prometric Testing Centers. This course is not open to students who have completed or who are currently enrolled in CS 332. (Letter Grade or Pass/No Pass)

EL 333 Introduction to Network Security
2.0 units

Acceptable for credit: D - Credit - Degree Applicable
Prerequisite: EL 106 - Networking Essentials 1

A comprehensive overview of network security. General security concepts, communications security, infrastructure security, basics of cryptography, and operational/organizational security will be covered. Prepares students to take the CompTIA Security+

Certification Exam at Prometric or Vue sites. (Fall, Spring) (Letter Grade Only)

EL 370 SkillsUSA
3.0 units
Acceptable for credit: D - Credit - Degree Applicable
Repeatable: 3.00
SkillsUSA is a partnership of students, teachers and industry working together to ensure America has a skilled workforce. This SkillsUSA course prepares students for employment and inter-collegiate competition in Career Technical Education. Students will learn to plan projects, work in teams, solicit community support and develop a range of skills valued by employers. Students registered for this class may not register for AB 370, ARCH 370, AT 370, ET 370, MT 370 or WLDT 370 during the same semester. Participation in the SkillsUSA competition is required. This course may be repeated up to three times for credit with different competitions. (Fall) (Letter Grade or Pass/No Pass)