Course Acronym:	ECHT
Course Number:	11
Descriptive Title:	Introduction to Electronics
Division:	Industry and Technology
Department:	Electronics and Computer Hardware Technology
Course Disciplines:	Electronics
Catalog Description:	This course is an introduction to electronics and provides the basis for further studies in electronics and computer hardware technology. Topics include safety, the basic theory and applications of electricity, analysis of circuit values using a standard scientific calculator, component identification and schematic diagrams, the techniques of electrical measurement and employment opportunities. Also introduced are alternating current measurements and the use of the oscilloscope. Electrical/electronic devices employed in automotive and air conditioning systems are also covered.
Prerequisite:	
Co-requisite:	
Recommended Preparation:	
Enrollment Limitation:	
Hours Lecture (per week):	2
Hours Laboratory (per week):	4
Outside Study Hours:	4
Total Course Hours:	108
Course Units:	3
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	Prior to July 1992
Transfer UC:	Yes
Effective Date:	
General Education: ECC	
Term:	
Other:	

CSU GE:	
Term:	
Other:	
IGETC:	
Term:	
Other:	
Student Learning Outcomes:	**SLO #1 Measuring Voltages and Currents** Measuring Voltage and Current The student will make basic "in-circuit" measurements: Alternating Current/Direct Current (AC/DC), Voltages and Currents, and Resistance, using both a Bench and Portable Digital Multimeter (DMM). **SLO #2 Experimental Data and Analysis Reporting** The students will be able to incorporate experimental data and analysis reporting protocols, using either "paper" or "paperless" environments, similar to data reporting and analysis used by many Electronics Manufacturers and Service Organizations. **SLO #3 Circuit Analysis Calculations** The students will be able to use various circuit analysis calculations to predict a basic circuits operation.
Course Objectives:	1. Apply fundamental circuit theories, Alternating Current (AC) and Direct Current (DC) to compute component values and voltages, resistances, currents, and power in various circuit configurations. 2. Differentiate color codes and component symbols to build a circuit. 3. Connect meters to circuits, select proper meter ranges and obtain accurate measurements. 4. Use a scientific calculator and a computer to calculate circuit values with data expressed using engineering notation. 5. Recognize dangerous situations in handling electric circuits and chemicals used in normal electronic work environment. 6. Identify employment options and preparations necessary for success. 7. Demonstrate the use of various types of test equipment, including Digital Multimeter (DMM), signal generators, power supplies and oscilloscope to make various circuit measurements.
Major Topics:	**I. OVERVIEW OF ELECTRONICS (6 hours, lecture)** A. Safety in the workplace and ECC laboratory B. Work ethic, teamwork, and diversity in the workplace C. How to deal with customers D. Employment opportunities **II. CONSTRUCTION AND TESTING OF ELECTRIC CIRCUITS (3 hours, lecture)** A. Circuit assembly with loose components and clip lead wires B. Proto board assembly of circuits C. Sources of electricity - cells and power supplies D. Circuit protection devices: fuses and current limiters

E. Troubleshooting and continuity testing
F. Use of meters for measuring voltage, resistance, and current

III. COMPONENT IDENTIFICATION (3 hours, lecture)

A. Visual identification of electronics components including color codes
B. Schematic symbols and diagrams
C. Component ratings and limitations, tolerance limits
D. Pin numbering, lead identification, orientation of "chips"
E. Electro-static discharge damage, pin soldering heat damage
F. Non-linear resistors: thermistor, varistor, light dependent resistor
G. Identification of components mounted on a printed circuit inside radio
H. Safety issues in handling consumer electronic products

IV. ELECTRIC CIRCUIT ANALYSIS (9 hours, lecture)

A. Ohm's Law for resistors
B. Power Law for resistors
C. Resistor analysis using scientific calculator
D. Analysis of series circuits using scientific calculator
E. Analysis of parallel circuits using scientific calculator
F. Voltage divider concepts
G. Simple series-parallel circuits
H. Introduction to computer circuit analysis

V. OTHER ELECTRICAL COMPONENTS (9 hours, lecture)

A. Series and parallel capacitor circuits
B. Capacitor testing and safety
C. Switches, switching logic and digital logic concepts
D. Solenoids and relays in control applications
E. Diode use in simple rectifier circuits
F. Solid state applications

VI. ALTERNATING CURRENTS (6 hours, lecture)

A. Sine wave sources
B. Measurement of sine wave forms
C. Use of oscilloscope in measuring voltages
D. Time period measurements and frequency calculation
E. Applications of the oscilloscope in troubleshooting
F. Safety concerns in using the oscilloscope
G. Simple filters
H. Digital applications

VII. ASSEMBLY PROCEDURES (10 hours, lab)

A. Introduction to the use of a DMM
B. Analog Volt-Ohm-Milliammeter (VOM)
C. Measuring circuits: voltage, current, and resistance

	D. Introduction to wiring schemes employed in the use of an Electronic Protoboard E. Identifying, measuring, and recording the component values of a predetermined group of components F. Use of voltage and current to various circuits built on the Protoboard **VIII. ELECTRIC CIRCUIT ANALYSIS (16 hours, lab)** A. Resistor color code measurements for resistors B. Analysis of series circuits using laboratory equipment C. Analysis of parallel circuits using laboratory equipment D. Voltage divider concepts and measurements E. Simple series-parallel circuit analysis using laboratory equipment F. Introduction to computer simulation for circuit analysis **IX. PASSIVE AND ACTIVE COMPONENT MEASUREMENTS (18 hours, lab)** A. Series and parallel capacitor circuits B. Capacitor testing and safety C. Switches, switching logic, and digital logic concepts D. Solenoids and relays in control applications E. Diode use in simple rectifier circuits F. Solid state applications **X. MEASUREMENTS FOR ALTERNATING CURRENTS (28 hours, lab)** A. Sine wave sources B. Measurement of sine wave forms C. Use of oscilloscope in measuring voltages D. Time period measurements and frequency calculation E. Applications of the oscilloscope in troubleshooting F. Safety concerns in using the oscilloscope G. Simple filters H. Digital applications
Total Lecture Hours:	36
Total Laboratory Hours:	72
Total Hours:	108
Primary Method of Evaluation:	2) Problem solving demonstrations (computational or non-computational)
Typical Assignment Using Primary Method of Evaluation:	Given a group of fifty assorted resistors, test each resistor and determine if their values are within specified tolerance by matching measured values with limits of tolerance. Report findings in a tabular form within a one-page lab report. Submit lab form, entitled "Resistor Color Code", to the instructor.
Critical Thinking Assignment 1:	Design a series circuit to divide a total voltage into five, ten, and fifteen volts. Report findings in a tabular form in a one-page lab report. Submit lab report to instructor.

Critical Thinking Assignment 2:	Design a switching circuit to reverse a DC motor and verify that it works correctly. Monitor the motor current before, during and after the reversal. Report findings in a tabular form within a one-page lab report. Submit lab report to instructor.
Other Evaluation Methods:	Performance exams Quizzes Laboratory Reports Class Performance Homework Problems Multiple Choice Completion True/False
Instructional Methods:	Demonstration Discussion Group Activities Laboratory Lecture Role Play Simulation
If other:	Using a computer to solve problems Actual consumer electronics sample identification
Work Outside of Class:	Study Required reading Problem solving activities
If Other:	
Up-To-Date Representative Texts:	Michael Schultz, Grob's Basic Electronics, 13th edition, McGraw Hill, 2021
Alternative Texts:	
Required Supplementary Readings:	
Other Required Materials:	Scientific Calculator Notebook
Requisite:	
Category:	
Requisite course(s): List both prerequisites and corequisites in this box.	
Requisite and Matching skill(s):Bold the requisite skill. List the corresponding course objective under each skill(s).	
Requisite Skill:	

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Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Walter Kahan
Date:	08/24/2015
Original Board Approval Date:	09/01/1983
Last Reviewed and/or Revised by:	ARNULFO RUNAS
Date:	10/18/2023
Last Board Approval Date:	01/17/2024
Effective Term:	FALL 2024