



El Camino College
COURSE OUTLINE OF RECORD – Official

Course Acronym:	ETEC
Course Number:	14B
Descriptive Title:	Electronics for Engineering Technologists II
Division:	Industry and Technology
Department:	Engineering Technology
Course Disciplines:	Electronics, Engineering Technology
Catalog Description:	<p>This is the second of two courses in which students are introduced to the application of electronics in engineering technology. The topics studied include safety, analog and digital waveforms, basic motors, number systems, logic gates, Boolean algebra, flip-flops, shift registers and micro-processors. Techniques in computer simulation and electrical measurements will be stressed.</p> <p><i>Note: the two-course sequence Engineering Technology 14A and Engineering Technology 14B is the same as Engineering Technology 14.</i></p>
Prerequisite:	
Co-requisite:	
Recommended Preparation:	Engineering Technology 14A
Enrollment Limitation:	
Hours Lecture (per week):	1
Hours Laboratory (per week):	2
Outside Study Hours:	2
Total Course Hours:	54
Course Units:	1.5
Grading Method:	Letter Grade only
Credit Status:	Credit, degree applicable
Transfer CSU:	Yes
Effective Date:	12/15/2008
Transfer UC:	No
Effective Date:	
General Education:	ECC
Term:	
Other:	

CSU GE:	
Term:	
Other:	
IGETC:	
Term:	
Other:	
Student Learning Outcomes:	<p>SLO #1 Logic Equivalencies</p> <p>Students will be able to use NAND and NOR Gates to configure and test logic equivalencies of: NOT, AND, OR, Exclusive OR and Exclusive NOR logic functions.</p> <p>SLO #2 Base 10 Conversion</p> <p>Given a negative two's complement binary number, convert this to a base 10 number.</p> <p>SLO #3 Asynchronous</p> <p>Counter Design and build a basic 4-bit Asynchronous Counter.</p> <p>SLO #4 JK Flip Flop</p> <p>Given a JK Flip Flop, identify what the output will be for all possible states of J and K.</p>
Course Objectives:	<ol style="list-style-type: none"> 1. Distinguish the causes and dangers of electrical shock and methods of prevention. 2. Connect meters to a circuit and obtain accurate measurements. 3. Use an oscilloscope to measure waveform time and voltage. 4. Recognize the relationship between the Boolean expression, logic diagram and truth table. 5. Describe binary addition and subtraction by designing circuits to produce correct answers. 6. Evaluate the use of shift registers in product design and the speed at which those products run. 7. Formulate flow charts to correctly apply simple programming concepts of microprocessors.
Major Topics:	<p>I. Overview of Materials and Safety (1 hours, Lecture)</p> <p>A. Material instructions</p> <p>B. Safety instructions</p> <p>II. Safety Lab (2 hours, Lab)</p> <p>A. Electrical shock</p>

	<p>B. Component handling</p> <p>III. Alternating Current (AC) Waveforms (2 hours, Lecture)</p> <p>A. Using the oscilloscope B. Amplitude</p> <p>IV. AC Waveforms Lab (4 hours, Lab)</p> <p>A. AC waveforms exercise B. Oscilloscope exercise</p> <p>V. RC and RL Time Constants (4 hours, Lecture)</p> <p>A. RC and RL reactance B. RC and RL RCL series impedance C. Resonance D. Motors</p> <p>VI. RC and RL Time Constants Lab (8 hours, Lab)</p> <p>A. RC and RL reactance exercise B. RC and RL RCL series impedance exercise</p> <p>VII. Solid-State Devices (1 hours, Lecture)</p> <p>A. Diodes B. Transistors C. Amplifiers D. Integrated analog circuits</p> <p>VIII Solid-State Devices Lab (2 hours, Lab)</p> <p>A. Diodes exercise B. Transistor exercise</p> <p>IX. Digital Electronics (10 hours, Lecture)</p> <p>A. Number systems B. Logic gates C. Boolean algebra D. Flip-flops E. Shift registers F. Microprocessors</p> <p>X. Digital Electronics Lab (20 hours, Lab)</p> <p>A. Number system exercise B. Logic gate exercise</p>
Total Lecture Hours:	18

Total Laboratory Hours:	36
Total Hours:	54
Primary Method of Evaluation:	2) Problem solving demonstrations (computational or non-computational)
Typical Assignment Using Primary Method of Evaluation:	Using computer simulation software, design a series circuit to divide a total voltage into five, ten and fifteen volts. Prove your design by building the circuit and making the voltage measurements. Report voltage measurements in tabular form on a one-page lab report and submit to the instructor.
Critical Thinking Assignment 1:	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. Record data on a one-page lab report and submit to the instructor.
Critical Thinking Assignment 2:	Use a standard laboratory frequency counter to compare the live frequency and the frequency output of a laboratory grade oscillator. Report the data on tabular form on a one-page lab report and submit to the instructor.
Other Evaluation Methods:	Class Performance Completion Laboratory Reports Matching Items Multiple Choice Other Exams Performance Exams Quizzes Term or Other Papers True/False Written Homework
Instructional Methods:	Demonstration Lab Lecture Multimedia presentations
If other:	Computer simulations
Work Outside of Class:	Journal (done on a continuing basis throughout the semester) Problem solving activity Required reading Study
If Other:	
Up-To-Date Representative Textbooks:	Robert Diaz. The Digital Connection. 2020 ed. El Camino College Bookstore. 2020.
Alternative Textbooks:	Project Lead the Way (PTLW) handouts Thomas Floyd, Digital Fundamentals, Eleventh Edition, Prentice Hall/Pearson, 2015 M. Morris Mano, Digital Design, Prentice Hall/Pearson, 5th edition, 2013
Required Supplementary Readings:	

Other Required Materials:	
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:	
Requisite Skill and Matching Skill(s): Bold the requisite skill(s). If applicable	
Requisite course:	Engineering Technology-14A
Requisite and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s).	<p>Work with electricity and hand tools safely.</p> <p>ETEC 14A - Distinguish the causes and dangers of electrical shock and methods of prevention.</p> <p>ETEC 14A - Describe the sequences in building and analyzing a simple circuit.</p> <p>ETEC 14A - Interpret electronic schematic symbols and determine use.</p> <p>Describe the basic components of an electrical circuit.</p> <p>ETEC 14A - Describe the sequences in building and analyzing a simple circuit.</p> <p>ETEC 14A - Interpret electronic schematic symbols and determine use.</p> <p>ETEC 14A - Analyze circuits using circuit simulation software.</p>
Requisite Skill:	
Requisite Skill and Matching skill(s): Bold the requisite skill. List the corresponding course objective under each skill(s). If applicable	
Enrollment Limitations and Category:	
Enrollment Limitations Impact:	
Course Created by:	Robert Diaz

Date:	10/19/2021
Original Board Approval Date:	12/15/2008
Last Reviewed and/or Revised by:	Robert Diaz
Date:	05/08/2020
Last Board Approval Date:	