South Central College
MECA 1210  Digital Electronics
MECA1210_cco_2013

Course Information

Description
This course explores the general fundamentals of digital electronic circuits. To learn the theory and operation of digital electronics, students will get hands-on experience with basic logic gates; sequential logic circuits, such as flip-flops, counters, and shift registers; and combinational logic circuits that include encoders, decoders, multiplexers, and arithmetic devices. A variety of measurement equipment will be used to test and troubleshoot solid state and digital circuits created on breadboards during lab sessions. Teamwork, critical thinking skills, and practical applications of circuits will be emphasized.

Instructional Level
15.061300

Total Credits
3.00

Total Hours
4.00

Types of Instruction

Instruction Type Credits
Classroom Presentation
On-Campus Lab

Pre/Corequisites

Prerequisite MECA 1122 Electricity - Devices and Circuits I

Course Competencies

1  Describe Digital Electronics
   Learning Objectives
   Identify characteristics of digital circuits
   Identify characteristics of linear (analog) circuits
   Describe the different types of multivibrators
   Analyze simple logic-level indicator circuits
   Demonstrate the basic operation of several lab instruments

2  Examine Number Systems
   Learning Objectives
   Describe the idea of place value in the decimal, binary, octal and hexadecimal number system
   Convert binary number to decimal and decimal numbers to binary
   Convert hexadecimal numbers to binary, binary to hexadecimal, hexadecimal to decimal, and decimal numbers to
nexadecimal
Convert octal numbers to binary, binary to octal, octal to decimal, and decimal numbers to octal
Use terms such as bit, nibble, byte, and word when describing data groupings

3 Examine Logic Gates
Learning Objectives
Memorize the name, symbol, truth table, function, and Boolean expression for the eight basic logic gates
Draw logic diagrams
Convert basic gates to other logic functions using inverters
Troubleshoot simple logic gate circuits

4 Combine Logic Gates
Learning Objectives
Draw logic diagrams from minterm and maxterm Boolean expressions
Design a logic diagram from a truth table
Reduce a minterm Boolean expression to its simplest form using Karnaugh maps
Identify the fundamentals of Programmable Logic Devices (PLDs)

5 Explain the inputs and outputs for basic logic gates, sequential logic circuits, and combinational circuits
Learning Objectives
Draw the logic symbol for the inverter, and, or, nor, xor, and xnor logic gates
Identify the function of the inverter, and, or, nor, xor, and xnor logic gates
Explain the function of a basic RS flip-flop and explain its primary variations to include D, JK, and latch
Describe the operation of both an asynchronous and synchronous counter
Generalize the loading (data in) and unloading (data out) of a shift register
Identify the schematic symbols for encoders, decoders, multiplexers, and comparators
Explain the applications for combinational logic circuits

6 Practice basic troubleshooting techniques
Learning Objectives
Use isolation techniques to verify and eliminate problems in a circuit
Understand the common types of defects for both hard-wired and PCB circuits
Read a schematic diagram
Use basic troubleshooting tools, such as meters, documentation, and effective notes

7 Utilize various test equipment, to include the multimeter, oscilloscope, logic probe, and function generator
Learning Objectives
Connect a digital multimeter into a circuit to measure resistance, voltage, and current
Acquire and measure alternating signals using an oscilloscope
Use a logic probe to determine the operation of digital circuits
Explain the various functions and purposes for inputting signals using a function generator

8 Build a final project that includes logic gates, sequential logic circuits, and combinational logic circuits
Learning Objectives
Read a digital electronics schematic that includes sequential and combinational logic circuits
Breadboard a moderately complicated digital electronics circuit onto a breadboard
Test and report the results of a digital circuit
9  Acquire skills to allow effective teamwork

Learning Objectives
Accept responsibility to complete projects as part of a team, not only as an individual
Build, test, demonstrate, and report on a capstone project as part of a team
Foster a learning environment by helping all team members maintain an equal level of competence
Adjust to team member's learning style, especially during lab experiments

SCC Accessibility Statement

If you have a disability and need accommodations to participate in the course activities, please contact your instructor as soon as possible. This information will be made available in an alternative format, such as Braille, large print, or cassette tape, upon request. If you wish to contact the college ADA Coordinator, call that office at 507-389-7222.

Disabilities page http://southcentral.edu/academic-policies/disability-rights.html