Digital Electronics(DE)PLTW

Mehlville School District
STEM
Grades 10 - 12, Duration 1 Year, 1 Credit

Rationale

Digital Electronics and embedded micro-computers (a direct application of Digital) are in every product that is either plugged into a wall or operated by batteries, and is therefore a technology that all people are exposed to in their daily lives. By providing educational experiences that stimulate real problems and real problem-solving tasks, the student will be afforded the opportunity to build a base of knowledge and experiences in Digital Electronics. As education continues to develop, opportunities for the student to become proficient in the integration and use of basic knowledge and lifetime skills are essential for meeting the needs of our ever changing world.

Course Description

This course provides an overview of the field of Electrical Engineering. The student will start with the beginnings of electronic circuits and work their way into understanding complex electronic circuits using a design process, various integrated circuit chips, field programmable devices, and robots. The student will use computer simulation software to design and test various circuits prior to the construction of these circuits. This course prepares the student to pursue two and four-year college degrees in engineering or engineering technology. At the end of the year the student will have the option of taking a college credit exam, at no cost, that is transferable to most colleges with engineering programs.

Prerequisites

Principles of Engineering (POE) with a "C" or higher and concurrently enrolled in Algebra II or higher; Open to: 11, 12
Credit: 1 Unit - Two Semesters (Practical Arts)
Weighted: 0.75

Course Objectives

1. The student will identify causes of hazards and preventive methods when working in the lab and designing an electronic circuit with 100% accuracy. (CA1, HPE6, SC8; 3.1, 3.8, 4.7) Locally assessed.

2. The student will read, explain and demonstrate the process of designing an electronic circuit with 80% accuracy. (CA3, HPE6, SC8; 1.2, 3.8, 4.7) Locally assessed. (A+: Reading)

3. The student will write mathematical symbols to represent different bases and demonstrate the relationship of binary and hexadecimal to bits and bytes of information used in computers with 90% accuracy. (MA5; 3.1, 3.2, 3.3) Locally assessed. (A+: Writing)

4. The student will use schematics and symbolic Algebra to represent digital gates in the creation of solutions to design problems with 80% accuracy. (CA1, CA4, MA1, SC1, SC7; 1.2, 1.8, 2.5, 3.1, 3.2, 3.5, 3.7) Locally assessed.

5. The student will recognize the relationship between the Boolean express, logic diagram, and truth table with 80% accuracy. (MA1, MA4; 2.5, 3.1, 3.2, 3.3) Locally assessed.

6. The student will present in an oral report, a solution to a design problem by investigating and evaluating the design and construct of a digital design with 80% accuracy. (CA1, CA3, CA4, 1.2, 1.4, 1.5, 3.1) Locally assessed. (A+: Speaking)

7. The student will design a circuit control display utilizing Multiplexers and Demultiplexers, discrete gates and MSI gates with 80% accuracy. (MA4; 1.2, 2.5, 3.1, 3.2, 3.3) Locally assessed.

8. The student will use logic compiler software to create Joint Electronic Device Engineering Council (JEDEC) files for programming Programmable Logic Devices (PLD's) with 80% accuracy. (MA5; 2.5, 3.1, 3.2, 3.3, 3.4) Locally assessed.

9. The student will interpret waveform diagrams from circuits they construct and compare them with combinational waveforms with 80% accuracy. (MA1, SC1; 2.5) Locally assessed.

10. The student will design, simulate, build and test asynchronous Mod counter using an integrated counter chip (MSI) with 80% accuracy. (MA5; 2.5, 3.1, 3.2, 3.3)

11. The student will research, define, calculate, and measure noise margin, drive capabilities, fan-out and propagation delay with 80% accuracy. (CA4, MA5; 1.8, 2.5, 3.1, 3.2, 3.3) Locally assessed. (A+: Research)

12. The student will create an interface to allow them to inspect, evaluate and manage program parameters in the microprocessor during the operation of a program with 80% accuracy. (MA5; 2.5, 3.1, 3.2, 3.3, 3.4) Locally assessed.

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BOE 11-6-14