KCKPS CTE CURRICULUM PACING GUIDE

DIGITAL ELECTRONICS

KSDE Course Code	21008G1.001115GGF	KSDE Course Name	Digital Electronics
CIP Code	14.0101	KSDE Pathway	Engineering & Applied Mathematics
Infinite Campus Course Numbers	13116031S, 13116031Y		
Prerequisites	Engineering Design (IED)		
Courses That Follow	Engineering Design & Development		
Buildings Offered	F.L. Schlagle, J.C. Harmon, Sumner		

KCKPS Course Description

Digital Electronics students use applied logic in the development of electronic circuits and devices. Students will use computer simulation software to design and test digital circuitry prior to the actual construction of circuits and devices. Examples of projects include designing and building circuits similar to alarm systems, car safety features and traffic lights.

Kansas Department of Education Course Competencies

Link to Career Cluster on KSDE

This course utilizes the approved competencies provided on the KSDE website. The competencies identified by KSDE provide the foundation for what students should know and/or be able to do by the end of the course.

Common District Summative Assessment

Precision Exam: Electronics 1

Description: The first in a sequence of courses that prepares individuals to apply technical knowledge and skills to assemble and operate electrical/electronic equipment used in business, industry, and manufacturing. Instruction includes training in safety, electrical theory, parallel & series circuits, Kirchoff's Laws, schematic diagrams, electrical components, and soldering.

Standards: https://www.precisionexams.com/kansas/files/standards-pdfs/ks_651.pdf

PACING GUIDE AT A GLANCE

Unit	Unit Name	Length
1	Foundations in Electronics	9 weeks
2	Combinational Logic	9 weeks
3	Sequential Logic	9 weeks
4	Controlling Real World Systems	9 weeks

KSDE COURSE COMPETENCIES

Competency	Unit Taught
1. Students will identify hazards in the lab and locations of the MSDS, safety equipment and resources.	1
2. Students will understand how to prevent dangers from electric shock, including environmental concerns and precautionary measures.	1
3. Students will define and explain direct and alternating currents along with components and schematics used in electronics circuitry.	1
4. Students will correctly calculate and set up lab equipment for safety, design, test, using Ohm's law and circuit measurements.	1
5. Students will identify and differentiate digital and analog waveforms.	1
6. Students will build and test a free running clock and calculate output frequencies from observations on an oscilloscope.	3
7. Students will design and build logic circuits derived from Boolean expressions and truth tables.	2
8. Students will use DeMorgan's Theorem, Karnaugh mapping, NOR, NAND and combinational logic solutions to reduce and simplify circuits.	2
9. Students will design, code and build logic circuits to control different kinds of displays.	2,3
10. Students will control the flow of data by utilizing multiplexers and demultiplexers.	2
11. Students will design and implement logic circuits using programmable logic devices that define combinational circuit designs using logic	2,3

compiler software.	
12. Students will compare and contrast operation of RS flip-flops, D flip-flops, and j-K flip-flops.	3
13. Students will understand, design and implement different circuits using synchronous, asynchronous, triggering and timing using flip-flops.	3
14. Students will design modification counters using timing from asynchronous flip-flops.	3
15. Students will conduct experiments with shift registers for memory storage and arithmetic circuits.	3
16. Students will design both half and full adders from logic circuits to do simple addition and subtraction using binary numbers.	2
17. Students will appropriately select, size and implement interface devices to control external devices.	4
18. Students will design and create programming to control the position of stepper motors and control speed and torque of servo motors.	4
19. Students will be able to formulate a flowchart to correctly apply basic programming concepts in the planning of a project.	4

UNIT 1

Foundations in Electronics — 9 weeks

Unit Overview

This unit focuses on safety, AC/DC power, and Ohm's law.

Unit Competencies

- Students will identify hazards in the lab and locations of the MSDS, safety equipment and resources.
- Students will understand how to prevent dangers from electric shock, including environmental concerns and precautionary measures.
- Students will define and explain direct and alternating currents along with components and schematics used in electronics circuitry.
- Students will correctly calculate and set up lab equipment for safety, design, test, using Ohm's law and circuit measurements.
- Students will identify and differentiate digital and analog waveforms.

Unit Resources

Primary Resources	Supplemental Resources
• PLTW curriculum	•

Vocabulary

current, voltage, resistance, direct current, alternating current, schematics, circuit, Ohms, digital waveform, analog waveform, voltage

UNIT 2

Combinational Logic 9 weeks

Unit Overview

This unit focuses on the basic logic of electronic circuits, such as car door and seat belt alarms.

Unit Competencies

- Students will design and build logic circuits derived from Boolean expressions and truth tables.
- Students will use DeMorgan's Theorem, Karnaugh mapping, NOR, NAND and combinational logic solutions to reduce and simplify circuits.
- Students will design, code and build logic circuits to control different kinds of displays.
- Students will control the flow of data by utilizing multiplexers and demultipexers.
- Students will design and implement logic circuits using programmable logic devices that define combinational circuit designs using logic compiler software.
- Students will design both half and full adders from logic circuits to do simple addition and subtraction using binary numbers.

Unit Resources

Primary Resources	Supplemental Resources
• PLTW curriculum	•

Vocabulary

UNIT 3

Sequential Logic 9 weeks

Unit Overview

This unit focuses on the way electronics have a memory and can adjust current state versus a previous state based on current conditions.

Unit Competencies

- Students will build and test a free running clock and calculate output frequencies from observations on an oscilloscope.
- Students will design, code and build logic circuits to control different kinds of displays.
- Students will design and implement logic circuits using programmable logic devices that define combinational circuit designs using compiler software.
- Students will compare and contrast operation of RS flip-flop, D flip-flops, and j-k flip-flops.
- Students will understand, design and implement different circuits using synchronous, asynchronous, triggering and timing using flip-flops.
- Students will design modification counters using timing from asynchronous flip-flops.
- Students will conduct experiments with shift registers for memory storage and arithmetic circuits.

Unit Resources

Primary Resources	Supplemental Resources
• PLTW curriculum	•

Vocabulary

UNIT 4

Controlling Real World Systems 9 weeks

Unit Overview

This unit focuses on the use of programming to control electrical systems.

Unit Competencies

- Students will appropriately select, size and implement interface devices to control external devices.
- Students will design and create programming to control the position of stepper motors and control speed and torque of servo motors.
- Students will be able to formulate a flowchart to correctly apply basic programming concepts in the planning of projects.

Unit Resources

Primary Resources	Supplemental Resources
• PLTW Curriculum	•

Vocabulary
