



Computer Engineering I: Introduction to Digital Electronics

Course Information

Grade(s):	9-12
Discipline/Course:	Technology Education
Course Title:	Computer Engineering 1: Introduction to Digital Electronics
Prerequisite(s):	N/A
Course Description: <i>Program of Studies</i>	The topics deal with the practical application of electronics and computers to the everyday lives of the consumer. Major areas of study include: residential household wiring, communication wiring and computer networking, and computer software and hardware. Suitable projects and activities will be used to support concepts and allow “hands-on” experiences with tools, equipment and software. The course meets for one semester.
Course Essential Questions:	<ul style="list-style-type: none"> ● Why is the practice of safety so rigidly enforced and adhered to by those who work on electrical systems/devices? ● How does the application of Ohm’s Law impact the world in which we live? ● How have digital electronics changed the world? ● What is a computer?
Course Enduring Understandings:	<ul style="list-style-type: none"> ● A computer is a device that is powered by electrical components, including hardware and software, that work together based on user input to create output.
Duration/Credits:	Half-Year / .5 credit(s)
Course Materials/Resources:	Consumables, lab computers, and tools
FPS Course Academic Expectation(s):	EU: Exploring and Understanding CI: Conveying Ideas

Year at a Glance (Units)	Unit 1 - Electrical Theory (6 weeks) Unit 2 - Circuit Construction & Soldering (5 weeks) Unit 3 - Digital Electronics/Computer (5 weeks)
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Unit Number and Title:	Unit 1 - Electrical Theory
Duration:	6 weeks
Resource(s):	N/A
Unit Overview:	Learning how electrical components work together to create a complete circuit.
Learning Goals	
Standard(s):	<p>ENG.08 Demonstrate the application of science and math principles to the electrical engineering process.</p> <p>ENG.08.02 Describe and apply the following electricity principles: Ohm's, Watt's, series, parallel, combination circuits, AC/DC systems, and conductors/insulators.*(G22)</p> <p>ENG.08.03 Use appropriate electrical units to solve problems.</p> <p>ENG.08.05 Describe work in electrical systems.</p> <p>ENG.08.06 Explain rate in electrical systems.</p> <p>ENG.08.07 Describe resistance in electrical systems.</p> <p>AUTO.06.06 Differentiate between series and parallel circuits.*(D20)</p> <p>AUTO.06.07 Define volts, amperes, and resistance.*(D21)</p> <p>AUTO.06.08 Perform simple calculations for volts, amperes, and resistance using Ohm's Law.*(D22)</p>
Essential Question(s):	<ul style="list-style-type: none"> ● How does the application of Ohm's Law impact the world in which we live? ● What is the purpose of a circuit diagram? ● Why is it essential to know how the parts of a basic electrical circuit function? ● How does the application of Ohm's Law impact the world in which we live? ● Why is understanding the terminology of electricity important in the life of a technician?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● What would the world be like without electricity?
Learning Goal(s): <i>Students will be able to use</i>	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> ● technology is people using tools, resources, and processes to solve problems or to extend their

<p><i>their learning to:</i> (Content/ Skills)</p>	<p>capabilities .</p> <ul style="list-style-type: none">● various electrical components, which may include: breadboards, perfboards, conductors and insulators, resistance and resistors, capacitance and capacitors, semiconductors and diodes, transistors. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none">● explain the purposes of a circuit diagram.● describe how parts of a basic electrical circuit function.● explain various types of electrical symbols and schematic diagrams.● use appropriate electrical units to solve problems.● define, use, and apply the terminology: atoms, electrons, and electric charges voltage, current and power, Ohm's Law and Watt's Law, Kirchoff's Laws, series, parallel, and series-parallel circuits.
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Unit Number and Title:	Unit 2 - Circuit Construction & Soldering
Duration:	5 weeks
Resource(s):	Tronix.ix Book 1
Unit Overview:	Build and test circuits that demonstrate principles discussed in the previous unit.
Learning Goals	
Standard(s):	<p>ENG.06 Use engineering equipment, laboratory materials and tools appropriately and safely.</p> <p>ENG.06.03 Use all tools and equipment safely</p> <p>ENG.06.04 Describe and demonstrate the proper use of engineering laboratory equipment.*(B6)</p> <p>ENG.06.05 Describe and demonstrate the components of personal and group laboratory safety.</p> <p>ENG.06.06 Describe and use safety laboratory equipment.</p> <p>ENG.06.07 Explain and demonstrate the proper use of personal protective equipment (PPE).*(B5)</p> <p>ENG.08.04 Draw a circuit diagram and lay out the circuit.</p>
Essential Question(s):	<ul style="list-style-type: none"> ● What impact has DC electrical application had on society? ● What impact has AC electrical application had on society? ● What is the difference between the construction of series, parallel, and combination circuits? ● Why does a technician need to understand the application of Ohm's Law in relation to series, parallel, and combination circuits? ● Why is it necessary to be able to demonstrate how to build circuits of different types properly?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Practical demonstration of designing circuits on a breadboard using given components. ● Devices we use daily are manufactured with electrical components in them.
Learning Goal(s): <i>Students will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> ● technology is people using tools, resources, and processes to solve problems or to extend their capabilities. ● understand various electrical components, which may include: breadboards, perfboards, conductors and insulators, resistance and resistors, capacitance and capacitors, semiconductors

and diodes, transistors.

- understand how a circuit schematic works in a computer.

Skills: (Students will be able to...)

- demonstrate the application and correct use of electric circuits, diagrams, and symbols, wires and cables, wiring tools and devices, soldering and wire splicing, chemical cells and batteries, special devices
- select and use various electrical components, which may include: breadboards, perfboard, conductors and insulators, resistance and resistors, capacitance and capacitors, semiconductors and diodes, transistors.
- build permanent circuits using soldering
- understand and use appropriate soldering tools.
- use multimeters as a tool when testing electrical circuits and measure current, voltage, & resistance.

Unit Number and Title:	Unit 3 - Computer Hardware & Software
Duration:	5 weeks
Resource(s):	N/A
Unit Overview:	Focus on basic computing and engage with hardware and software.
Learning Goals	
Standard(s):	CADD.04 Identify, describe, and utilize the basic hardware and operating systems used in CADD. CADD.04.01 Identify and describe various types of hardware and software.*(B11) CADD.04.02 Identify and describe the purpose of operating system components.*(B12) CADD.04.03 Define and apply computer terminology*(B13)
Essential Question(s):	<ul style="list-style-type: none"> ● What are the functions of main components in a computer? ● How do computer components work together as a system? ● How do the components interact when a computer is turned on? ● What are the basic functions of computer hardware? ● What are the major desktop components? ● How does a basic computer network function?
Enduring Understanding(s):	<ul style="list-style-type: none"> ● Hardware and software are the main categories of computer systems
Learning Goal(s): <i>Students will be able to use their learning to:</i> (Content/ Skills)	<p>Content: (Students will know...)</p> <ul style="list-style-type: none"> ● the interaction between hardware and software. <p>Skills: (Students will be able to...)</p> <ul style="list-style-type: none"> ● describe the basic functions of computer hardware ● identify the major desktop components and interfaces, and their functions

- describe a binary system and how it relates to digital electronics.
- build digital circuits.
- select and install an operating system.