DIGITAL ELECTRONICS Curriculum

This curricula and accompanying instructional materials have been developed to align with the NJSLS and in accordance with the NJ Department of Education's guidelines to include: Curriculum designed to meet grade level expectations, integrated accommodations and modifications for students with IEPs, 504s, ELLs, and gifted and talented students, assessments including benchmarks, formative, summative, and alternative assessments, a list of core instructional and supplemental materials, pacing guide, interdisciplinary connections, integration of 21st century skills, integration of technology, and integration of 21st Century Life and Career standards.

About the Standards

In 1996, the New Jersey State Board of Education adopted the state's first set of academic standards called the Core Curriculum Content Standards. The standards described what students should know and be able to do upon completion of a thirteen-year public school education. Over the last twenty years, New Jersey's academic standards have laid the foundation for local district curricula that is used by teachers in their daily lesson plans.

Revised every five years, the standards provide local school districts with clear and specific benchmarks for student achievement in nine content areas. Developed and reviewed by panels of teachers, administrators, parents, students, and representatives from higher education, business, and the community, the standards are influenced by national standards, research-based practice, and student needs. The standards define a "Thorough and Efficient Education" as guaranteed in 1875 by the New Jersey Constitution. Currently the standards are designed to prepare our students for college and careers by emphasizing high-level skills needed for tomorrow's world.

The New Jersey Student Learning Standards include Preschool Teaching and Learning Standards, as well as nine K-12 standards for the following content areas: **21st Century Life and Careers, Comprehensive Health and Physical Education, English Language Arts, Mathematics, Science, Social Studies, Technology, Visual and Performing Arts, World Languages**

Lower Cape May Regional Digital Electronics Curriculum	
Content Area: Engineering	
Course Title: Digital Electronics	**Grade level: 11-12**
Unit 1: Foundations in Electronics	**Dates for Units: Marking Pd. 1**
Unit 2: Combinational Logic	**Date for Unit: Marking Pd. 2**
Unit 3: Sequential Logic	**Dates for Units: Marking Pd. 3**
Unit 4: Controlling Real World Systems	**Dates for Units: Marking Pd. 4**
Date Created: 03-06-2018	**Board Approved On:**

Lower Cape May Regional Digital Electronics Curriculum Unit 1 Overview
Content Area: Engineering
Unit Title: Foundations in Electronics
Target Course/Grade Level: Digital Electronics /11-12

Unit Summary: **Students will be introduced to electron theory, circuit theory laws, components used to build a circuit, safe soldering practice, breadboards, engineering notation, and AOI logic circuit design.**

Interdisciplinary Connections:

Social Studies

- 6.1.4.B.9 Relate advances in science and technology to environmental concerns, and to actions taken to address them.*
- 6.1.4.C.18 Explain how the development of communications systems has led to increased collaboration and the spread of ideas throughout the U.S. and the world.*

Science

- HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Integration of 21st Century Skills

- **CRP2-**Students will apply applicable academic skills
- **CRP4-**Students will communicate effectively, clearly and with reason
- **CRP5-**Students will consider the environmental, social, and economic impacts of decisions
- **CRP6-**Students will demonstrate creativity and innovation
- **CRP7-**Students will employ valid and reliable research strategies
- **CRP8-**Students will utilize critical thinking to make sense of problems and persevere in solving them
- **CRP11-**Students will utilize technology to enhance productivity

Integration of Technology Standards

- **8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.
- **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming:** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Integration of 21st Century Life and Career Standards

- **9.2 Career Awareness, Exploration, and Preparation:** Students will understand the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- **9.3 Career and Technical Education:** Students will know and understand the expectations aligned with the completion of a CTE Program of Study.

Learning Targets	
	NJSLS Standards
8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Unit Enduring Questions:

- Why are the safety practices important?
- Why are hand calculations important when a software can perform the same calculations?
- 3 How are analog and digital components used in products that you use?
- How can you use your soldering skills beyond this course?
- Can a digital and analog circuit be designed to accomplish the same tasks?
- Why is the understanding of binary and decimal number

Unit Enduring Understandings:

- Every career field requires technical literacy and career-specific knowledge and skills to support professional practice.
- All digital circuits are created from base 2 mathematics. Knowledge of number systems and mathematical relationships of analog circuits are fundamental to understanding and creating circuits.
- Electronics requires specific knowledge related to working safely, the tools, and the electrical components used within the field.
- Create specific outputs in a circuit based on specific inputs.
- The foundation of digital circuits based on the use of memory

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systems essential to your ability to design combinational logic circuits?
● How can the engineering design process be adapted to produce a circuit?
● How can a computer software design (CSD) and measurement tools be applied to an engineering design process?
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Unit Objectives:
Students will know….
● How to calculate voltage, current, and/or resistance for components in a circuit.
● How to solve for unknown values in a circuit by applying Ohm’s law.
● How to properly solder and de-solder components to printed circuit boards according to best practices.
● How to measure current, voltage, and/or resistance within a circuit or across a component using a digital multimeter (DMM).

● Citing Textual Evidence
Critical Vocabulary: Allusion, Allegory, Oxymoron, Euphemism, Fallacious Reasoning, Voir Dire, Due Process, Prosecution, Defense, Reasonable Doubt, Culpability, Circumstantial Evidence

● -Use parallel structure
● -Utilize semicolon
● -Use various types of phrases and clauses
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Unit Objectives:
Students will be able to…...
● Demonstrate and apply appropriate safety procedures when working with electronics in a classroom.
● Calculate total resistance for a circuit by applying Kirchhoff’s Voltage Law and Kirchhoff’s Current Laws.
● Demonstrate that digital components, such as transistors, and analog components, such as resistors and capacitors, can be used to create logic gates.
● Identify, implement, and/or describe integrated circuits’ properties from their part number, schematic symbol, and/or data sheet.
● Create, interpret, and/or modify an AOI combinational logic circuit based on design requirements according to a systematic process for designing a combinational logic circuit.
● Create an AOI circuit on a breadboard from a schematic
● Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.
● Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text
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Ocean City High School Digital Electronics Curriculum
Unit 2 Overview

Content Area: Engineering

Unit Title: Combinational Logic

Target Course/Grade Level: Digital Electronics /11-12

Unit Summary:

Students will create truth tables from word problems, create functioning circuits using AOI logic, K-map and use Boolean Algebra to reduce the size of circuits. Binary adders, multiplexers and de-multiplexers will be introduced as well as Programmable Logic Devices (PLDs)

Interdisciplinary Connections:

Social Studies

- 6.1.4.B.9 Relate advances in science and technology to environmental concerns, and to actions taken to address them.*
- 6.1.4.C.18 Explain how the development of communications systems has led to increased collaboration and the spread of ideas throughout the U.S. and the world.

Science

HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.*

Integration of 21st Century Skills

- **CRP2-**Students will apply applicable academic skills
- **CRP4-**Students will communicate effectively, clearly and with reason
- **CRP5-**Students will consider the environmental, social, and economic impacts of decisions
- **CRP6-**Students will demonstrate creativity and innovation
- **CRP7-**Students will employ valid and reliable research strategies*
- **CRP8-**Students will utilize critical thinking to make sense of problems and persevere in solving them
- **CRP10-**Students will plan education and career paths aligned to personal goals
- **CRP11-**Students will utilize technology to enhance productivity

Integration of Technology Standards

- **8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and

synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.

- **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming:** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*

Integration of 21st Century Life and Career Standards

- **9.2 Career Awareness, Exploration, and Preparation:** Students will understand the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.*

Learning Targets

	NJSLS Standards
8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.

Unit Enduring Questions:	**Unit Enduring Understandings:**
• How can a set of design specifications be transformed into a functional	• Strategic and systematic design and inquiry processes guide the development of an

combinational logic circuit? ● How do a truth table, logic expression, and circuit design interrelate? ● How are all logic expressions, regardless of complexity, simply AND, OR, and INVERTER gates. ● Why are NAND gates and NOR gates considered universal gates? ● How can universal gates be used to create a combinational logic design? ● How are K-mapping and Boolean algebra applied to logic expressions? ● How can seven-segment displays be integrated into your design process? ● How are common digital circuits such as binary adders, multiplexers, and de-multiplexers used in common electronic devices? ● How can Circuit Design Software (CDS) ● and Programmable Logic Devices (PLDs) be used in an engineering design process? ● How can a PLD be used to model a complex physical circuit?	effective solution to the problem ● Successful engineers exhibit specific personal and professional characteristics that lend themselves to the creative, collaborative, and solution-driven nature of the profession. ● Create specific outputs in a circuit based on specific inputs. ● The practice of engineering requires the application of mathematical principles and common engineering tools, techniques, and technologies ● Every career field requires technical literacy and career-specific knowledge and skills to support professional practice.
Unit Objectives: ***Students will know….*** ● that there are many versions of a design process that describe essentially the same process. ● How to apply computational thinking to generalize and solve a problem using a computer. ● How to translate design requirements into Boolean expressions and/or a truth table ● How to interpret and/or modify a multiplexed or de-multiplexed circuit to make it more efficient. ● How to simplify an AOI circuit design by applying mathematics, K-Mapping, and/or universal gates. ● That common logic gates are designed to fit in Integrated Circuits (ICs) for easier use in design. These ICs are	**Unit Objectives:** ***Students will be able to…...*** ● Produce a physical model using electronic components. ● Apply Boolean algebra theorems and De Morgan's theorems to simplify expressions. ● Identify a logic gate from a truth table or write a truth table representing a logic gate. ● Create, interpret, and/or modify a multiplexed or de-multiplexed circuit to make it more efficient. ● Translate a set of design specifications into a functional NAND or NOR combinational logic circuit, determine when NAND only or NOR only implementations are the most efficient design, and implement effectively into a circuit. ● Create specific outputs in a circuit based on specific inputs. ● Implement a seven-segment display into a circuit design to display alphanumeric values

most often found in two styles: Small Scale Integration (SSI) and Medium Scale Integration (MSI). • **-Citing Textual Evidence** **Critical Vocabulary: Allusion, Allegory, Oxymoron, Euphemism, Fallacious Reasoning, Voir Dire, Due Process, Prosecution, Defense, Reasonable Doubt, Culpability, Circumstantial Evidence** • **-Use parallel structure** • **-Utilize semicolon** • **-Use various types of phrases and clauses**	using seven-segment display drivers. • **Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text** • **Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text**

Lower Cape May Regional Digital Electronics Curriculum Unit 3 Overview
Content Area: Engineering
Unit Title: Sequential Logic
Target Course/Grade Level: Digital Electronics / 11-12
Unit Summary: • Students will use D and J/K flip-flops to create asynchronous clock signals and use those signals in a circuit to produce a timer with reset, start and stop inputs.
Interdisciplinary Connections: **Social Studies** • 6.1.4.B.9 Relate advances in science and technology to environmental concerns, and to actions taken to address them. • 6.1.4.C.18 Explain how the development of communications systems has led to increased collaboration and the spread of ideas throughout the U.S. and the world.* **Science** HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.*
Integration of 21st Century Skills • **CRP2-**Students will apply applicable academic skills • **CRP4-**Students will communicate effectively, clearly and with reason

- **CRP5**-Students will consider the environmental, social, and economic impacts of decisions
- **CRP6**-Students will demonstrate creativity and innovation
- **CRP7**-Students will employ valid and reliable research strategies
- **CRP8**-Students will utilize critical thinking to make sense of problems and persevere in solving them
- **CRP10**-Students will plan education and career paths aligned to personal goals
- **CRP11**-Students will utilize technology to enhance productivity*

Integration of Technology Standards

- **8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.*
- **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming:** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.

Integration of 21st Century Life and Career Standards:

- **9.2 Career Awareness, Exploration, and Preparation:** Students will understand the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- **9.3 Career and Technical Education:** Students will know and understand the expectations aligned with the completion of a CTE Program of Study.*

Learning Targets

	NJSLS Standards
8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability,

	maintenance and repair, and human factors engineering (ergonomics).
8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
	NJSLS Standards
8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.

Unit Enduring Questions: ● How can sequential and differential logic circuits be used in a product that you use? ● How would you explain the function and use of a flip-flop to someone with limited electronics background? ● What are some of the common applications of flip-flops? ● How can D flip-flops or J/K flip-flops be arranged to create a desired asynchronous clock signal? ● Why is it important to have a counter or to start at specific values? ● How can a synchronous counter be designed to start and stop or repeat a count at the desired values?	**Unit Enduring Understandings:** ● Every career field requires technical literacy and career-specific knowledge and skills to support professional practice. ● The foundation of digital circuits based on the use of memory ● Electronics requires specific knowledge related to working safely, the tools, and the electrical components used within the field. ● An engineering design process is an iterative, systematic approach to problem solving. ● Professional practice is guided by professional ethics and standards and requires effective communication and collaboration.
Unit Objectives: ***Students will know….*** ● How to design, interpret, and/or modify common sequential logic circuits, such	**Unit Objectives:** ***Students will be able to…...*** ● Draw or analyze detailed timing diagrams for the D or J/K flip-flop's Q output in response to

as counters, event detectors, and shift registers, using flip-flops based on given design requirements. ● How to design, interpret, and/or modify asynchronous counter circuits based on specific design requirements using SSI and/or MSI to count up/down, hold/rest, and start/stop counts according to any desired range. ● How to identify and describe the characteristics of common components and logic gates. ● How to design a circuit, simulate a circuit, and verify a measurement and/or hand calculation using circuit design software (CDS). ● **-Citing Textual Evidence** **Critical Vocabulary: Allusion, Allegory, Oxymoron, Euphemism, Fallacious Reasoning, Voir Dire, Due Process, Prosecution, Defense, Reasonable Doubt, Culpability, Circumstantial Evidence** ● **-Use parallel structure** ● **-Utilize semicolon** ● **-Use various types of phrases and clauses**	a variety of synchronous and asynchronous input conditions. ● Analyze and/or design introductory flip-flop applications, such as latches, event detection circuits, data synchronizers, shift registers, and frequency dividers. ● Describe where a count starts and where a count stops/repeats on a modulus asynchronous counter. ● Describe how Programmable Logic Devices (PLDs) allow designers to bypass breadboarding and test designs on devices, such as a Field Programmable Gated Array (FPGA), reducing the time needed in design. ● Select and apply the appropriate components, tools, and technology when creating or characterizing a design. ● **Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.** ● **Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text**

Lower Cape May Regional Digital Electronics Curriculum Unit 4 Overview
Content Area: Engineering
Unit Title: Controlling Real World Systems
Target Course/Grade Level: Digital Electronics / 11-12
Unit Summary: ● Students will be introduced to the State Machine and how it can be used in various products. ● Students will program microcontrollers to control real-world systems

Interdisciplinary Connections:

Social Studies

- 6.1.4.B.9 Relate advances in science and technology to environmental concerns, and to actions taken to address them.*
- 6.1.4.C.18 Explain how the development of communications systems has led to increased collaboration and the spread of ideas throughout the U.S. and the world.

Science

HS-PS2-1 Analyze data to support the claim that Newton's second law of motion describes the mathematical relationship among the net force on a macroscopic object, its mass, and its acceleration.

Integration of 21st Century Skills (Choose all that apply by denoting an asterisk).

- **CRP3-**Students will attend to personal health and financial well-being
- **CRP4-**Students will communicate effectively, clearly and with reason
- **CRP5-**Students will consider the environmental, social, and economic impacts of decisions
- **CRP6-**Students will demonstrate creativity and innovation*
- **CRP7-**Students will employ valid and reliable research strategies
- **CRP8-**Students will utilize critical thinking to make sense of problems and persevere in solving them
- **CRP10-**Students will plan education and career paths aligned to personal goals
- **CRP11-**Students will utilize technology to enhance productivity

Integration of Technology Standards

- **8.1 Educational Technology:** All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and create and communicate knowledge.*
- **8.2 Technology Education, Engineering, Design and Computational Thinking - Programming:** All students will develop an understanding of the nature and impact of technology, engineering, technological design, computational thinking and the designed world as they relate to the individual, global society, and the environment.*

Integration of 21st Century Life and Career Standards

- **9.2 Career Awareness, Exploration, and Preparation:** Students will understand the importance of being knowledgeable about one's interests and talents, and being well informed about postsecondary and career options, career planning, and career requirements.

- **9.3 Career and Technical Education:** Students will know and understand the expectations aligned with the completion of a CTE Program of Study.*

Learning Targets	
	NJSLS Standards

8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.
8.2.12.C.3	Analyze a product or system for factors such as safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, and human factors engineering (ergonomics).
8.2.12.C.4	Explain and identify interdependent systems and their functions.
8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.
	NJSLS Standards
8.2.12.A.2	Analyze a current technology and the resources used, to identify the trade-offs in terms of availability, cost, desirability and waste.
8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
8.2.12.B.4	Investigate a technology used in a given period of history, e.g., stone age, industrial revolution or information age, and identify their impact and how they may have changed to meet human needs and wants.
8.2.12.C.2	Analyze a product and how it has changed or might change over time to meet human needs and wants.

Unit Enduring Questions:	**Unit Enduring Understandings:**
● 1 How is a state machine design used in electronics? ● How can a state machine be used in a product that you use? ● Why are microcontrollers such a valuable tool today in electronics? ● What are the components and processes associated with programming	● Allow circuits to make decisions on the next action based on the current state. ● There are a wide range of tools that allow designers to create logic on a larger scale and faster ● There are a wide range of tools that allow designers to create logic on a larger scale and faster.

microcontrollers to control real-world systems?	• Engineering practice requires effective communication with a variety of audiences using multiple modalities.
Unit Objectives: ***Students will know….*** • How to design, interpret, and/or modify a state machine based on specific design requirements to communicate the design. • How to create, interpret, and/or modify a program to manage inputs and outputs of a microcontroller • Synthesize an ill-formed problem into a meaningful, well-defined problem. • Create logic using a programming language. • **Citing Textual Evidence** **Critical Vocabulary: Allusion, Allegory, Oxymoron, Euphemism, Fallacious Reasoning, Voir Dire, Due Process, Prosecution, Defense, Reasonable Doubt, Culpability, Circumstantial Evidence** • **-Use parallel structure** • **-Utilize semicolon** • **-Use various types of phrases and clauses**	**Unit Objectives:** ***Students will be able to…...*** • Identify, create, interpret, or modify a state machine design based on design requirements according to a systematic process. • Describe the components and structure of a state machine. • Draw or interpret a state graph and construct or interpret a state transition table for a state machine • Select appropriate hardware and translate a set of design requirements into a program that completes a task. • Create, interpret, or modify a program to control a servo's speed and/or position. • **Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences drawn from the text.** • **Determine a central idea of a text and analyze its development over the course of the text, including how it emerges and is shaped and refined by specific details; provide an objective summary of the text**

Lower Cape May Regional Digital Electronics Curriculum Evidence of Learning
Specific Formative Assessments Utilized in Daily Lessons: • Participation • Journal entries • Reading Checks • Vocabulary Quizzes • Journal Prompts • Grammar exercises • Kahoot • Socrative • Text-based Analysis questions

- Discussion questions
- Exit cards
- Daily classwork worksheets
- Homework
- Short writing prompts
- Google Doc Writing Conferences
- Close-read annotations

Summative Assessment Utilized throughout Units:

- QBA's
- EOC's

Modifications for Special Education

- Teacher tutoring
- Peer tutoring
- Cooperative Learning Groups
- Modified Assignments
- Differentiated Instruction
- Response to Intervention (www.help4teachers.com)
- Follow all IEP modifications

Accommodations for 504 & GATE

- Tiered instruction
- Visual aids as necessary
- RTI: Judy Elliot Video Resource

Accommodations for ELL Students

- Increased wait time
- Cooperative learning groups
- Utilization of visuals (graphic organizers, labeling)
- Modeling, role play, act-it out
- Simplify complex questions
- Emphasize 5-8 key vocabulary words per lesson.
- Print, and avoid cursive/manuscript when applicable
- Check often for comprehension.
- Modify assignments as needed
- Provide a variety of texts of multiple levels.

Accommodations for At-Risk Students

- Visual Reminders
- Demonstration and Modeling
- Include hands-on experiences and manipulatives when possible.

- Continue to repeat and rephrase the major point(s) of the unit or lesson.
- Insert meanings of vocabulary continuously throughout the lesson.
- Demonstrate how to use graphic organizers and then provide them so students learn how to categorize and organize information.
- Provide study guides for tests well in advance of the test.
- Offer copies of lecture notes to students who cannot copy accurately or quickly, have poor penmanship, or note-taking skills. Throughout the year help students fix their own notes using yours as a guide.
- Reduce the variety of tasks
- Teach writing each day; don't just assign it
- Utilize a graphic organizer for organization
- More ideas here

Teacher Notes:

- As required by the NJ Department of Education, teachers in all content areas will integrate the 21st Century Life and Careers Standards. As the NJDOE indicates, "Providing New Jersey students with the life and career skills needed to function optimally within this dynamic context is a critical focus and organizing principle of K-12 public education. New Jersey has both an obligation to prepare its young people to thrive in this environment, and a vested economic interest in grooming an engaged citizenry made up of productive members of a global workforce that rewards innovation, creativity, and adaptation to change." The links below indicate the CPIs for grade ranges and need to be addressed throughout the units of study:
  Life and Career Standards

Project-based Learning Tasks:

- Create circuits using both components and Multisim virtual software.

Vocabulary:

- In-text vocabulary should be incorporated into every unit. Word journals, vocabulary walls, and/or various other activities should be utilized by the instructor to teach vocabulary.

The Research Process:

- The research process must be integrated within each course curriculum. Student will be provided with opportunities to investigate issues from thematic units of study. As the NJSLS indicate, students will develop proficiency with MLA or APA format as applicable.

Technology:

- Students must engage in technology applications integrated throughout the curriculum.

Resources: Ancillary resources and materials used to deliver instruction are included below:

- Multisim
- Xilinx

Differentiation Strategies Differentiation strategies can require varied amounts of preparation time. High-prep strategies often require a teacher to both create multiple pathways to process information/demonstrate learning and to assign students to those pathways. Hence, more ongoing monitoring and assessment is often required. In contrast, low-prep strategies might require a teacher to strategically create process and product choices for students, but students are allowed to choose which option to pursue given their learning profile or readiness level. Also, a low-prep strategy might be focused on a discrete skill (such as vocabulary words), so there are fewer details to consider. Most teachers find that integration of one to two new low-prep strategies and one high-prep strategy each quarter is a reasonable goal.	
Low Prep Strategies (add to list as needed)	
Varied journal prompts, spelling or vocabulary lists	Students are given a choice of different journal prompts, spelling lists or vocabulary lists depending on level of proficiency/assessment results.
Anchor activities	Anchor activities provide meaningful options for students when they are not actively engaged in classroom activities (e.g., when they finish early, are waiting for further directions, are stumped, first enter class, or when the teacher is working with other students). Anchors should be directly related to the current learning goals.
Choices of books	Different textbooks or novels (often at different levels) that students are allowed to choose from for content study or for literature circles.
Choices of review activities	Different review or extension activities are made available to students during a specific section of the class (such as at the beginning or end of the period).
Homework options	Students are provided with choices about the assignments they complete as homework. Or, students are directed to specific homework based on student needs.
Student-teacher goal setting	The teacher and student work together to develop individual learning goals for the student.
Flexible grouping	Students might be instructed as a whole group, in small groups of various permutations (homogeneous or heterogeneous by skill or interest), in pairs or individual. Any small groups or pairs change over time based on assessment data.

Varied computer programs	The computer is used as an additional center in the classroom, and students are directed to specific websites or software that allows them to work on skills at their level.
Multiple Intelligence or Learning Style options	Students select activities or are assigned an activity that is designed for learning a specific area of content through their strong intelligence (verbal-linguistic, interpersonal, musical, etc.)
Varying scaffolding of same organizer	Provide graphic organizers that require students to complete various amounts of information. Some will be more filled out (by the teacher) than others.
Think-Pair-Share by readiness, interest, and/or learning profile	Students are placed in predetermined pairs, asked to think about a question for a specific amount of time, then are asked to share their answers first with their partner and then with the whole group.
Mini workshops to re-teach or extend skills	A short, specific lesson with a student or group of students that focuses on one area of interest or reinforcement of a specific skill.
Orbitals	Students conduct independent investigations generally lasting 3-6 weeks. The investigations "orbit" or revolve around some facet of the curriculum.
Games to practice mastery of information and skill	Use games as a way to review and reinforce concepts. Include questions and tasks that are on a variety of cognitive levels.
Multiple levels of questions	Teachers vary the sorts of questions posed to different students based on their ability to handle them. Varying questions is an excellent way to build the confidence (and motivation) of students who are reluctant to contribute to class discourse. Note: Most teachers would probably admit that without even thinking about it they tend to address particular types of questions to particular students. In some cases, such tendencies may need to be corrected. (For example, a teacher may be unknowingly addressing all of the more challenging questions to one student, thereby inhibiting other students' learning and fostering class resentment of that student.)
High Prep Strategies (add to list as needed)	
Cubing	Designed to help students think about a topic or idea from many different angles or perspectives. The tasks are placed on the six sides of a cube and use commands that help support thinking (justify, describe, evaluate, connect, etc.). The students complete the task on the side that ends face up, either independently or in homogenous

	groups.
Tiered assignment/ product	The content and objective are the same, but the process and/or the products that students must create to demonstrate mastery are varied according to the students' readiness level.
Independent studies	Students choose a topic of interest that they are curious about and wants to discover new information on. Research is done from questions developed by the student and/or teacher. The researcher produces a product to share learning with classmates.
4MAT	Teachers plan instruction for each of four learning preferences over the course of several days on a given topic. Some lessons focus on mastery, some on understanding, some on personal involvement, and some on synthesis. Each learner has a chance to approach the topic through preferred modes and to strengthen weaker areas
Jigsaw	Students are grouped based on their reading proficiency and each group is given an appropriate text on a specific aspect of a topic (the economic, political and social impact of the Civil War, for example). Students later get into heterogeneous groups to share their findings with their peers, who have read about different areas of study from source texts on their own reading levels. The jigsaw technique allows you to tackle the same subject with all of your students while discreetly providing them the different tools they need to get there.
Multiple texts	The teacher obtains or creates a variety of texts at different reading levels to assign strategically to students.
Alternative assessments	After completing a learning experience via the same content or process, the student may have a choice of products to show what has been learned. This differentiation creates possibilities for students who excel in different modalities over others (verbal versus visual).
Modified Assessments	Assessments can be modified in a variety of ways – for example by formatting the document differently (e.g. more space between questions) or by using different types of questions (matching vs. open ended) or by asking only the truly essential questions.
Learning contracts or Personal Agendas	A contract is a negotiated agreement between teacher and student that may have a mix of requirements and choice based on skills and understandings considered important by the teacher. A personal agenda could be quite similar, as it would list the tasks the teacher wants each student to accomplish in a given day/lesson/unit. Both

	Learning contracts and personal agendas will likely vary between students within a classroom.
Compacting	This strategy begins with a student assessment to determine level of knowledge or skill already attained (i.e. pretest). Students who demonstrate proficiency before the unit even begins are given the opportunity to work at a higher level (either independently or in a group).
Literature circles	Flexible grouping of students who engage in different studies of a piece of literature. Groups can be heterogeneous and homogeneous.
Learning Centers	A station (or simply a collection of materials) that students might use independently to explore topics or practice skills. Centers allow individual or groups of students to work at their own pace. Students are constantly reassessed to determine which centers are appropriate for students at a particular time, and to plan activities at those centers to build the most pressing skills.
Tic-Tac-Toe Choice Board (sometimes called "Think-Tac-Toe"	The tic-tac-toe choice board is a strategy that enables students to choose multiple tasks to practice a skill, or demonstrate and extend understanding of a process or concept. From the board, students choose (or teacher assigns) three adjacent or diagonal. To design a tic-tac-toe board: - Identify the outcomes and instructional focus - Design 9 different tasks - Use assessment data to determine student levels - Arrange the tasks on a tic-tac-toe board either randomly, in rows according to level of difficulty, or you may want to select one critical task to place in the center of the board for all students to complete.

Curriculum development Resources/Instructional Materials:

- PLTW.org

Board of Education Approved Text(s)

- N/A