Wall Township Public Schools	Board Approval Date: 8/19/2025
Course Title: Grade 3 - STEM	
Course Description: This course integrates hands-on engineering challenges with foundational coding instruction using SAM Labs and Code.org. Aligned to the New Jersey Student Learning Standards, students will explore problem-solving, automation, and emerging technologies through real-world applications and collaborative projects. The course builds digital fluency and critical thinking while fostering creativity and innovation.	

New Jersey Student Learning Standards

Disciplinary Concepts and Core Ideas:

Computing Systems: People interact with a wide variety of computing devices that collect, store, analyze, and act upon information in ways that can affect human capabilities both positively and negatively. The physical components (hardware) and instructions (software) that make up a computing system communicate and process information in digital form.

Networks and the Internet: Computing devices typically do not operate in isolation. Networks connect computing devices to share information and resources and are an increasingly integral part of computing. Networks and communication systems provide greater connectivity in the computing world.

Data & Analysis: Computing systems exist to process data. The amount of digital data generated in the world is rapidly expanding, so the need to process data effectively is increasingly important. Data is collected and stored so that it can be analyzed to better understand the world and make more accurate predictions.

Algorithms & Programming: An algorithm is a sequence of steps designed to accomplish a specific task. Algorithms are translated into programs, or code, to provide instructions for computing devices. Algorithms and programming control all computing systems, empowering people to communicInteraction of Technology and Humans Societies influence technological development. Societies are characterized by common elements such as shared values, differentiated roles, and cultural norms, as well as by entities such as community institutions, organizations, and businesses. Interaction of Technology and Humans concerns the ways society drives the improvement and creation of new technologies, and how technologies both serve and change society.

Engineering Design: People design for enjoyment and to solve problems, extend human capabilities, satisfy needs and wants, and improve the human condition. Engineering Design, a systematic approach to creating solutions to technological problems and

finding ways to meet people's needs and desires, allows for the effective and efficient development of products and systems.

Nature of Technology: Human population, patterns and movement focus on the size, composition, distribution, and movement of human populations and how they are fundamental and active features on Earth's surface. This includes understanding that the expansion and redistribution of the human population affects patterns of settlement, environmental changes, and resource use. Patterns and movements of population also relate to physical phenomena including climate variability, landforms, and locations of various natural hazards and their effects on population size, composition, and distribution.

Effects of Technology on the Natural World: Many of engineering and technology's impacts on society and the environment are widely regarded as desirable. However, other impacts are regarded as less desirable. Effects of Technology on the Natural World concerns the positive and negative ways that technologies affect the natural world.

Ethics & Culture: Ethics and Culture concerns the profound effects that technologies have on people, how those effects can widen or narrow disparities, and the responsibility that people have for the societal consequences of their technological decisions.

Course Sequence & Pacing

Unit Title	Lesson:
Unit 1: Digital Foundations & Responsible Computing	1-4
Unit 2: Building with Code and Circuits	5-8
Unit 3: Sensing Our World	9-13
Unit 4: Innovation and Impact	14-18

Unit 1

Desired Results

Unit 1 Title: Digital Foundations & Responsible Computing

Unit Summary: In this unit, students explore how to use technology responsibly and safely while beginning to develop foundational coding skills. They learn sequencing, algorithms, and programming basics while also gaining an understanding of online safety and digital citizenship.

Learning Standards

8.1.5.AP.1 - Compare and refine multiple algorithms for the same task and determine which is the most appropriate.
8.1.5.NI.1 - Develop models that successfully transmit and receive information using both wired and wireless methods.
8.1.5.DA.1 - Collect, organize, and display data in order to highlight relationships or support a claim.
8.1.5.AP.2 - Create programs that use clearly named variables to store and modify data.
8.1.5.AP.3 - Create programs that include sequences, events, loops, and conditionals.
8.1.5.AP.4 - Break down problems into smaller, manageable sub-problems to facilitate program development.
8.2.5.ED.1 - Explain the functions of a system and its subsystems.
8.2.5.ITH.2 - Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills

9.4.5.CT.1 - Identify and gather relevant data that will aid in the problem-solving process

Interdisciplinary Connections

NJSLS - ELA 2023

RI.IT.4.3. Describe the impact of individuals and events throughout the course of a text, explaining events, procedures, ideas, or concepts in a historical, scientific, or technical text, including what happened and why, based on evidence in the text.

SL.PE.4.1. Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly.

NJSLS - SCIENCE 2020

3-5-ETS1-1 / ETS1-2 – Define a design problem and generate multiple solutions.

Learning Targets

Unit Essential Questions:

- What makes a solution “effective” when solving a STEM problem?
- How can algorithms help us solve everyday problems?
- Why is it important to communicate and collaborate when working with technology?
- How can we use technology safely and responsibly?
- What are the building blocks of computer programming?

Unit Enduring Understandings:

- Effective solutions are clear, testable, and based on logical steps; trial and error is part of the design process.
- Algorithms are step-by-step instructions that help people and computers complete tasks efficiently and accurately.
- STEM work requires teamwork, clear communication, and shared problem-solving to refine ideas and improve outcomes.
- Technology must be used with awareness of privacy and safety.
- Programs are made by creating and following sequences of instructions.

Vocabulary:

Program Algorithm	Digital Footprint Sequence	Gravity Force Debug/Bug	Engineer Privacy

Students will be able to:

- Identify safe and responsible ways to use digital devices and the internet.
- Create and follow simple algorithms to complete tasks.
- Debug basic code to fix errors in sequencing or logic.

Unit 1 Focus: *Students will learn about their rings of responsibility in being safe decisions online by thinking beyond themselves and recognize the ripple effects of their actions. Implementing the basics of coding students will build interactive games by working through problem solving debugging in the crowd-source model.*

Week 1:
Lesson Title: Digital Citizenship & Internet Safety:
Key Activities: Lesson on online safety, privacy, and responsible tech use

Week 2:
Lesson Title: Algorithms & Sequencing

Resources used: Code.org - Course C Lessons 1-6 SAM Labs: Magnetic Forces CommonSense.org - Rings of Responsibility	**Key Activities:** Puzzles on sequencing; intro to algorithms; In Students will create programs with sequencing, loops, events and investigate problem-solving techniques and building interactive games. **Week 3:** **Lesson Title:** Programming Basics **Key Activities:** Loops, conditionals with unplugged activities and puzzles **Week 4:** **Lesson Title:** Magnets and Movement **Key Activities:** Students will learn the cause and effect of magnetic interactions. Students will work collaboratively to integrate and exhibit learning by building a 'magnetic car' in order to measure the effect magnets have on its movement.

Learning Activities:

Amistad Law Alignment (N.J.S.A. 18A 52:16A-88)

Focus: Contributions of African Americans to the development of STEM, innovation, and American history.

- Connection: Highlight African American pioneers in STEM such as Katherine Johnson (NASA mathematician), George Washington Carver (agricultural scientist), or Mark Dean (co-inventor of the personal computer).
- Classroom Tie-In: Integrate short biographical STEM spotlights or coding warm-ups honoring diverse innovators during algorithm lessons.

Climate Change Alignment

Focus: Introduce the Purpose of STEM as a Tool for Problem Solving

- Connection: Frame STEM not just as "techy stuff" but as a way to help people and the planet.
- Instructional Tie-In: Ask students to brainstorm environmental problems they care about (e.g., too much plastic, energy waste, endangered animals).
- Learn how responsible digital practices reduce e-waste and environmental impact by understanding the broader consequences of technology use.

Diversity & Inclusion Alignment (N.J.S.A. 18A:35-4.36a)

- Highlight diverse contributions in STEM
  Include daily or weekly spotlights honoring STEM pioneers from various backgrounds (e.g., African American, Indigenous, women, scientists with disabilities), sharing diverse perspectives and demonstrating that innovation comes from all

communities.
- Promote inclusive collaboration.
- Explore representation in technology and learn how inclusive digital environments empower voices from all backgrounds.
- Emphasize team roles, respectful communication, and diverse thinking in hands-on tasks. Encourage students to notice and respect diverse approaches during group planning and problem-solving.

Assessment Evidence

Formative Assessments:

- Exit tickets asking students to define terms like “algorithm” or “prototype”
- Observation checklists during group work or coding tasks
- Think-pair-share prompts (e.g., “What do you do if your code doesn’t work?”)
- Quick reflection journals or coding notebooks
- “Unplugged” card-sorting activities matching inputs/outputs or coding terms

Summative Assessments:

- Create and explain a basic algorithm for a classroom task (e.g., how to line up)
- Design challenge: build a simple system using inputs/outputs and explain how it works
- Short written quiz with vocabulary and coding logic questions
- Final group project: Plan, design, and present a basic STEM solution with visuals

Common Benchmark Assessments:

- Grade-wide digital logic and vocabulary quiz using Google Forms or another platform
- Coding comprehension assessment (identify bugs, fix a broken sequence)
- Standardized rubric to score a small-scale design task aligned to NJSLS-TECH and CLKS

Alternative Assessments:

- Create a screencast or voice recording explaining how an algorithm works
- Build a physical model or poster that shows a working input/output system
- Oral explanation or peer teaching of a coding concept
- Comic strip or storyboard showing the process of debugging a mistake

Core Instructional & Supplemental Materials

Sam Labs
Code.org
Typing Club
Mystery Science

Accommodations and Modifications:
Students with Disabilities, English Language Learners,
Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:

Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one
- Additional time - Review of directions
- Student restates information
- Space for movement or breaks
- Extra visual and verbal cues and prompts
- Preferential seating
- Follow a routine/schedule
- Rest breaks
- Verbal and visual cues regarding directions and staying on task
- Checklists
- Immediate feedback

Specific Strategies and Practices that Support English Language Learners

English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts
- Personal Glossary
- Extended Time
- Simplified/Verbal Instructions
- Frequent Breaks
- Visual learning- including graphic organizers
- Teacher modeling

Students at Risk of Failure

- Home/School Connection
- Alternative Assessments
- Learning Contracts

- Leveled Rubrics and Tiered Activities
- Work Alone Choice
- Group Work Choice

Students with 504 Plans

- Teachers are responsible for implementing designated services and strategies identified on a student's 504 Plan.
- 504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way.
- Students' accommodations are outlined in their individual 504 plan.

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

- Homogeneous Grouping
- Small Group In-Depth Instruction
- Differentiated Online Practice
- Alternative Assessments
- Pre-Assess to provide Differentiated Instruction to Accelerate Learning
- Supplemental Reading
- Engaging projects

Unit 2

Desired Results

Unit 2 Title: Building with Code and Circuits

Unit Summary: Students are introduced to hands-on design and engineering through SAM Labs. They learn how to build circuits using input/output systems, integrate conditionals, and use sensors to solve real-world problems.

Learning Standards

8.2.5.ED.3 - Follow step by step directions to assemble a product or solve a problem, using appropriate tools to accomplish the task.
8.2.5.NT.2 - Identify new technologies resulting from the demands, values, and interests of individuals, businesses, industries, and societies.
8.1.5.DA.3 - Organize and present collected data visually to communicate insights gained from different views of the data.
8.2.5.ED.5 - Describe how specifications and limitations impact the engineering design process.
8.2.5.ED.2 - Collaborate with peers to collect information, brainstorm to solve a problem, and evaluate all possible solutions to provide the best results with supporting sketches or models.
8.2.5.ETW.2 - Describe ways that various technologies are used to reduce improper use of resources.
8.1.5.AP.6 - Develop programs using an iterative process, implement the program design, and test the program to ensure it works as intended.
8.1.5.CS.1 - Recommend improvements to computing devices in order to improve the ways users interact with the devices.

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills

9.4.5.CT.2 - Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.

9.4.5.IML.1 - Evaluate digital sources for accuracy, perspective, credibility and relevance

Interdisciplinary Connections

NJSLS - SCIENCE 2020

3-5-ETS1-2 - Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

4-PS4-3 - Generate and compare multiple solutions that use patterns to transfer information.

4-PS3-4 – Apply scientific ideas to design, test, and refine a device that converts energy.

NJSLS - MATH 2023

3.OA - Solve two-step problems involving any of the four operations; model equations with variables and assess answers using mental math and estimation

Learning Targets

Unit Essential Questions:

- How do sensors help machines interact with the world?
- What role do loops, conditionals, and events play in coding smart systems?
- How does testing and debugging improve our designs?
- How do we use technology to solve real-world problems?
- How do engineers solve problems using code and circuits?
- What is the role of input and output in digital systems?

Unit Enduring Understandings:

- Sensors detect changes in the environment and allow machines to respond with programmed actions.
- Control structures like loops and conditionals help systems make decisions, repeat actions, and respond to specific events efficiently.
- Iterative testing and debugging help identify errors and refine a system so it works more reliably and effectively.
- Smart technologies are designed to make life easier, safer, or more efficient by solving problems through automation and innovation.
- Engineering involves designing, testing, and improving systems.
- Sensors and outputs allow us to create interactive solutions using coding.

Vocabulary:

Sensor Input Output Event	Loop Conditional System Circuit	Code Sequence Debug Automate	Trigger-action Response Program

Students will be able to:

- Design and build simple interactive systems using inputs and outputs.
- Use conditional logic to trigger specific actions in SAM Labs programs.
- Test and refine engineering solutions to meet specific goals.

Unit 2 Focus: *Students explore how technology can sense and respond to the world around them. By using sensors, code, and hands-on design, students build simple systems that react to light, sound, or motion. They begin to use loops and events programming*

<u>Week 5:</u>
Lesson Title: Intro to Engineering Design
Key Activities: Create simple systems using motors/sensors (Trigger-Action)

while connecting technology to natural systems and real-world uses. **Resources used:** SamLabs Code.org (Course C Lessons 7-9) (Course D Lessons 3-5) Mystery Science BrainPopJr Free Content	**Week 6:** **Lesson Title:** Collecting & Using Data **Key Activities:** Use light sensor and block-basic logic to trigger events **Week 7:** **Lesson Title:** Animal Characteristics Game **Key Activities:** During this SAM Labs STEAM lesson for Grade 3, students will gain understanding of how animals have inherited and adapted characteristics which aid their survival. Students will integrate and exhibit learning by creating systems to facilitate a team quiz on categories and adapted characteristics of animals. **Week 8:** **Lesson Title:** Decomposition & Debugging **Key Activities:** Debugging puzzles and finding patterns; Students will practice debugging in the "collector" environment. Students will get to practice reading and editing code to fix puzzles with simple algorithms, loops and nested loops.

Learning Activities:

Amistad Law Alignment (N.J.S.A 18A 52:16A-88)

- Engineering and design challenges highlight innovations by underrepresented groups, encouraging students to value diverse perspectives in problem-solving and invention.

Diversity & Inclusion Alignment (N.J.S.A. 18A:35-4.36a)

- Acknowledge economic diversity through design challenges: Pose scenarios that require designing affordable, low-resource sensor systems, highlighting that not all communities have equal access to technology and prompting empathy in student design.
- Explore biases in data and sensors: Introduce age-appropriate discussions about how social or cultural biases (e.g., race, gender norms) can affect sensor effectiveness (like skin tone detection or voice recognition) and why inclusive design matters.

Climate Change Alignment

Smart System Design with Environmental Purpose

- Lesson Tie-In: Apply knowledge learned about animal characteristics and its importance in their survival.
- Integration: Have students design a quiz that is in game format for animal characteristics using the SAM Lab sensors.

Sensor-Based Conservation Projects

- Lesson Tie-In: *Smart Light or Sound System*
- Integration: Program lights or sound systems that only activate when needed (e.g., motion-activated lighting). Connect this to reducing unnecessary power use in buildings.
- Computational Thinking: Triggered events, conditionals
- Environmental Application: Teaches the practical use of Cleantech principles in everyday life.

Discussion Prompt: Can We Code for the Planet?

- Mini-Reflection or Class Talk
- Ask: "How could sensors or smart systems help people protect natural resources like water, electricity, or clean air?"
- Encourage ideas like drip irrigation sensors, pollution monitors, or waste-sorting systems.
- Reinforces the idea that coding isn't just for games—it can solve real problems.

Assessment Evidence

Formative Assessments:

- Quick code check-ins – Students predict what a short block of code will do before testing it.
- Sensor exit tickets – Ask: "What is the input in our system today? What output did it trigger?"
- Partner observation – Teachers use a checklist to observe student collaboration and use of control structures (loops, conditionals).
- Sticky-note self-assessment – Students rate their confidence in concepts like loops or debugging.
- Think-alouds – Students explain their reasoning while building or testing smart systems.

Summative Assessments:

- Final Smart System Build – Students design, code, and demonstrate a functional system using at least one sensor, loop, and conditional.
- STEM journal reflection – Students explain how their system works and describe how it could help solve a real-world problem.
- Vocabulary quiz – Terms like input, output, loop, sensor, debug, and automate.
- Design plan submission – Include labeled diagrams and code logic with annotations.

Common Benchmark Assessments:

- Standardized coding task – All students complete a brief program challenge using provided blocks and identify inputs/outputs.
- Performance rubric – Used across classrooms to assess smart system projects (creativity, logic, sensor use, functionality).
- Tech vocabulary and logic quiz – Digital or paper-based assessment shared across the grade level.

Alternative Assessments:

- Video explanation – Students record themselves explaining how their system works step-by-step.
- Storyboard/comic strip – Illustrates how their smart system responds to sensor input in a real-world setting.

- Oral presentation – Students present their build to peers or a visiting class using visuals and simplified language.
- Tactile model – For students with language or processing needs, using physical objects to show input-output pathways.

Core Instructional & Supplemental Materials
Sam Labs
Code.org
Typing Club
Mystery Science

Accommodations and Modifications: Students with Disabilities, English Language Learners, Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:

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- Small group/One to one
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- Space for movement or breaks
- Extra visual and verbal cues and prompts, Verbal and visual cues regarding directions and staying on task
- Preferential seating
- Follow a routine/schedule, Rest breaks
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- Pre-teaching of vocabulary and concepts, Teacher modeling
- Personal Glossary
- Extended Time
- Simplified/Verbal Instructions
- Visual learning- including graphic organizers

Students at Risk of Failure

- Home/School Connection
- Alternative Assessments
- Learning Contracts
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- Homogeneous Grouping
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- Differentiated Online Practice
- Alternative Assessments
- Pre-Assess to provide Differentiated Instruction to Accelerate Learning
- Supplemental Reading
- Engaging projects

Unit 3

Desired Results

Unit 3 Title: Sensing Our World

Unit Summary: This unit challenges students to apply coding and engineering skills to tackle practical problems. They use logic, functions, and automation to create solutions that demonstrate how technology can improve everyday life.

Learning Standards

8.1.5.AP.4 - Break down problems into smaller, manageable sub-problems to facilitate program development.
8.1.5.AP.3 - Create programs that include sequences, events, loops, and conditionals.
8.1.2.AP.5 - Describe a program's sequence of events, goals, and expected outcomes.
8.1.5.CS.3 - Identify potential solutions for simple hardware and software problems using common troubleshooting strategies
8.2.5.ED.5 - Describe how specifications and limitations impact the engineering design process.
8.2.5.ITH.2 - Evaluate how well a new tool has met its intended purpose and identify any shortcomings it might have.

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills

9.4.5.CT.1: Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.2 - Identify a problem and list the types of individuals and resources (e.g., school, community agencies, governmental, online) that can aid in solving the problem.
9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

Interdisciplinary Connections

NJSLS - SCIENCE 2020

3-5-ETS1-1: Define a simple design problem reflecting a need or want, including specific criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2: Generate and compare multiple potential solutions to a problem, based on how well each is likely to meet the problem's criteria and constraints.
3-ESS3-1: Make a claim about the effectiveness of a design solution in reducing the effects of a weather-related hazard. This could involve solutions such as barriers to prevent flooding, wind-resistant roofs, and lightning rods.

NJSLS - SOCIAL STUDIES 2020

6.1.5.CivicsPD.2 – Engage in discussions to consider multiple perspectives and promote decision-making.
6.3.5.CivicsPR.4 – Communicate with others to inform or influence change.

NJSLS - MATH 2023

4.NBT.A.1–A.3 – Understanding place value, reading/writing large numbers, and rounding multi-digit numbers.
4.NBT.B.4 – Fluent standard-algorithm addition and subtraction for multi-digit whole numbers

Learning Targets

Unit Essential Questions:

- How can we use technology to design solutions to everyday problems?
- Why is planning important before building a solution?
- How do functions and automation make systems smarter?
- What can we learn from failed attempts?
- How can technology help us understand and respond to environmental changes?
- What are the patterns in nature we can simulate with code?

Unit Enduring Understandings:

- Technology allows us to design, test, and improve solutions that address real-life challenges in creative and practical ways.
- Careful planning helps us identify needs, choose materials wisely, and organize steps for building effective and efficient solutions.
- Functions allow for reusable code, and automation helps systems perform tasks consistently without human input.
- Failures are valuable opportunities to learn, improve designs, and develop resilience as problem-solvers.
- Technology can be used to model natural processes and solve real-world problems.
- Patterns in data and nature help inform design and decision-making.

Vocabulary:

Evaporation Condensation	Water Cycle Loop Simulation	Natural Disaster Design Constraints	Actuator Iteration

Students will be able to:

- Model natural systems and environmental changes using sensors and code.
- Collect and analyze data from real-world observations or simulations.
- Use loops and conditionals to improve program efficiency and accuracy.

Unit 3 Focus: *Investigate natural processes and environmental systems by applying coding and data collection techniques to model and address real-world scientific challenges.*

Resources used:
Code.org (Course C Lessons 10 -11)
Mystery Science

<u>Week 9:</u>
Lesson Title: Input and Output Devices
Key Activities: Hands-on with SAMLabs inputs (buttons, sensors) and outputs (buzzers and lights)
<u>Week 10:</u>
Lesson Title: Where Do Clouds Come From?
Key Activities: Water cycle exploration and model building

SAM Labs	**<u>Week 11:</u>** **Lesson Title:** Looping and Animation **Key Activities:** Animation using loops and student creativity (Course C Lessons 10 -11) **<u>Week 12:</u>** **Lesson Title:** Building for a Purpose **Key Activities:** Design a working model to solve a classroom problem **<u>Week 13:</u>** **Lesson Title:** Could a Volcano Pop Up Where You Live? **Key Activities:** Geography and natural disasters; Design an emergency solution

Learning Activities:

Diversity & Inclusion Alignment (N.J.S.A. 18A:35-4.36a)

- Design with community in mind - Encourage students to identify problems in diverse communities (e.g., accessibility needs for peers with disabilities) and design inclusive solutions, reinforcing empathy and equity.
- Support multiple entry points - Offer varied project options and scaffolded tasks so learners of differing strengths (including ELLs or students with disabilities) can access and succeed in STEM challenges.

Climate Change Alignment

Energy-Conscious Engineering

- Students use creativity to develop technology-based solutions to climate-related problems, reinforcing environmental responsibility.
- Explore weather systems impact on lives

Amistad Law Alignment (N.J.S.A. 18A 52:16A-88)

- Lessons incorporate stories of environmental leadership and resilience from African-American scientists and innovators who have impacted our understanding of the natural world.

Assessment Evidence

Formative Assessments:

- Design journal entries – Students sketch and explain their design ideas as they evolve.
- Code walk-throughs – Students verbally explain their code to a partner or teacher.
- Mid-build check-ins – Students complete a checklist or “red-yellow-green” reflection on their progress.
- Gallery walk with peer feedback – Students share prototypes in progress and receive peer questions or suggestions.

- Debugging tasks – Provide a broken function or logic sequence for students to fix and explain

Summative Assessments:

- Final design project – Students create a functioning system that solves a real-world problem, includes a written or verbal explanation, and incorporates functions or automation.
- Presentation – Students present their design and process to peers or a panel, using visuals and technical vocabulary.
- Design process reflection – Students write about the steps they took, changes they made, and what they learned.
- Rubric-scored prototype – Evaluate criteria like innovation, coding accuracy, function use, teamwork, and problem-solving.

Common Benchmark Assessments:

- Coding logic mini-assessment – Evaluate student ability to write or read functions and identify their role in a program.
- Performance-based task – All students complete the same design challenge with rubric-based scoring.
- Engineering design plan template – Completed by all students, showing their problem, prototype plan, materials, and solution logic.

Alternative Assessments:

- Video explanation – Students record themselves describing their system and how it solves the problem.
- Storyboard – Students draw the steps their system follows and annotate with technical terms.
- Oral interview – One-on-one conversation where students explain their design and thought process.
- Tactile model demonstration – For students with language needs, a hands-on explanation using props and guided questions.

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- Differentiated Online Practice
- Alternative Assessments & Engaging projects
- Pre-Assess to provide Differentiated Instruction to Accelerate Learning
- Supplemental Reading

Unit 4

Desired Results

Unit 4 Title: Innovation and Impact

Unit Summary: In the final unit, students apply their coding and engineering skills to design creative projects and solutions. They learn storytelling through code, refine their prototypes, and present final innovations in a showcase.

Learning Standards

8.1.5.IC.1 - Identify computing technologies that have impacted how individuals live and work and describe the factors that influenced the changes.
8.1.5.IC.2 - Identify possible ways to improve the accessibility and usability of computing technologies to address the diverse needs and wants of users.
8.1.5.DA.1 - Collect, organize, and display data in order to highlight relationships or support a claim.
8.2.5.ED.6 - Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.
8.2.5.ITH.4 - Describe a technology/tool that has made the way people live easier or has led to a new business or career.
8.2.5.ETW.2 - Describe ways that various technologies are used to reduce improper use of resources.
8.2.5.ETW.3 - Explain why human-designed systems, products, and environments need to be constantly monitored, maintained, and improved.
8.2.5.ED.6 - Evaluate and test alternative solutions to a problem using the constraints and tradeoffs identified in the design process.

Interdisciplinary Connections

Career Readiness, Life Literacies, & Key Skills

9.4.5.CT.1 - Identify and gather relevant data that will aid in the problem-solving process.

9.4.5.CT.3: Describe how digital tools and technology may be used to solve problems.

9.4.5.CI.1: Use appropriate communication technologies to collaborate with individuals with diverse perspectives about a local and/or global climate change issue and deliberate about possible solutions.

9.4.5.IML.2: Create a visual representation to organize information about a problem or issue..

9.4.5.IML.3: Represent the same data in multiple visual formats in order to tell a story about the data .

9.4.5.TL.5: Collaborate digitally to produce an artifact

Interdisciplinary Connections

NJSLS - SCIENCE 2020

3-ESS3-1: Natural Hazards: Make a claim about the merit of a design solution that reduces the impacts of climate change and/or a weather-related hazard. Examples of design solutions to weather-related hazards could include barriers to prevent flooding, wind resistant roofs, and lighting rods.

NJSLS - ELA 2023

SL.PI.4.4. Report on a topic or text, tell a story, or recount an experience in an organized manner, using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

SL.UM.4.5. Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes.

W.IW.4.2. Write informative/explanatory texts to examine a topic and convey ideas and information clearly.

NJSLS - MATH 2023

4.DL.A.1 – Create data-based questions, generate ideas based on the questions, and then refine the questions.

4.DL.A.2 – Develop strategies to collect various types of data and organize data digitally.

4.DL.A.3 – Understand that subsets of data can be selected and analyzed for a particular purpose.

4.DL.A.4 – Analyze visualizations of a single data set, share explanations, and draw conclusions that the data supports.

Learning Targets

Unit Essential Questions:

- How can we use technology to share ideas and solve problems?
- Why is iteration important in the design process?

Unit Enduring Understandings:

- Creativity and innovation are essential to using technology effectively.
- Design is a cycle that includes prototyping, testing, and refining solutions.
- Collecting, organizing, and analyzing data helps us make informed decisions and refine our solutions for better performance.
- Strong presentations include organized ideas, visual supports, and clear explanations that help others understand and value our work.
- Technology has ethical, social, and environmental effects, and we have a responsibility to design and use it in ways that are fair, safe, and helpful.

Vocabulary:

Storyboard Event	Presentation Innovation	Engineer Collaboration	Resilience Project	Animation Model

Students will be able to:

- Design and code animated stories and interactive digital projects.
- Refine digital and physical prototypes using iterative design methods.
- Present projects and explain the design process, purpose, and outcomes.

Unit 4 Focus: *Encourage creativity, collaboration, and innovation as students apply coding and engineering skills to develop and present solutions that make a positive impact. In the final unit, students apply their coding and engineering skills to design creative projects and solutions. They learn storytelling through code, refine their prototypes, and present final innovations in a showcase.* **Resources used:** Code.org (CS Fundamentals: Course D) Mystery Science: Hurricane vs. Tornado SAM Labs	**Week 14:** **Lesson Title:** Storytelling with Code **Key Activities:** Students create animated story using conditionals **Week 15:** **Lesson Title:** Iteration in Engineering **Key Activities:** Refine student models, test for reliability **Week 16:** **Lesson Title:** How Could You Survive a Natural Disaster? **Key Activities:** Plan a survival kit/system using tech & design thinking **Week 17:** **Lesson Title:** Final Coding Project **Key Activities:** Design and build an original game or story project **Week 18:** **Lesson Title:** STEM Expo Week **Key Activities:** Showcase projects from SAM Labs, Mystery Science, and Code.org

Learning Activities:

Diversity & Inclusion Alignment (N.J.S.A. 18A:35-4.36a)

- Lesson: *Showcase Presentations*
    - Connection: Ensure a diverse presentation environment by prompting students to highlight how their project can serve different communities equitably. During the showcase, foster an inclusive atmosphere by using unbiased language, encouraging peer respect, and celebrating diverse perspectives.

Climate Change Alignment

- Lesson: Energy-Conscious Engineering
    - Students use creativity to develop technology-based solutions to climate-related problems, reinforcing environmental responsibility.
    - Explore weather systems impact on lives

Amistad Law Alignment (N.J.S.A. 18A 52:16A-88)

- Lesson: Equity and Justice
    - Students reflect on how technology can be used to promote equity and justice, inspired by changemakers who leveraged innovation to support civil rights and community empowerment.

Holocaust Law Alignment (N.J.S.A. 18A:35 - 28)

- Lesson: Innovation & AI Ethics Discussion
    - Connection: Facilitate a discussion about how AI and technology have been misused in historical contexts such as surveillance, propaganda, or discriminatory practices during the Holocaust. Highlight the ethical responsibility modern innovators have to prevent technology from facilitating bias or oppression.

Assessment Evidence

Formative Assessments:

- Ethics scenario journal – Students respond to short prompts about the responsible use of AI.
- Peer feedback on presentation drafts – Students give structured comments on clarity and visuals.
- Exit tickets – Students reflect on how AI can help or harm society.
- Presentation practice rounds – Informal rehearsal with self-assessment checklists.
- Vocabulary checks – Quick quizzes or games reviewing terms like algorithm, bias, innovation, and impact.

Summative Assessments:

- Final STEM project presentation – Students present their prototype or innovation with visuals and explanations.
- Digital artifact submission – Includes code, diagrams, data, and student reflection.
- Written reflection – Students explain the purpose of their project, challenges they faced, and how they solved them.

Common Benchmark Assessments:

- Presentation rubric – Standardized tool for scoring organization, clarity, vocabulary use, and content.
- Project design log – All students submit a log of their design process and AI application.
- Tech fluency check – Grade-level mini-assessment on responsible tech use, coding logic, and project communication.

Alternative Assessments:

- Video presentation – Students record themselves explaining their innovation.
- Poster board or infographic – Students represent their work visually with minimal text.
- One-on-one oral interview – Teacher checks understanding through guided conversation.
- Annotated slide deck – Students turn in their presentation with notes explaining their thinking.

Core Instructional & Supplemental Materials

Sam Labs	Typing Club
Code.org	Mystery Science

Accommodations and Modifications:
Students with Disabilities, English Language Learners,
Students at Risk of Failure, Students with 504s, Gifted & Talented Students

Specific Strategies and Practices that Support Students with Disabilities:

Students receiving Special Education programming have specific goals and objectives, as well as accommodations and modifications outlined within their Individualized Education Plans (IEP) due to an identified disability and/or diagnosis. In addition to exposure to the general education curriculum, the instruction is differentiated based upon the student's needs. The IEP acts as a supplemental curriculum guide inclusive of instructional strategies that support each learner.

- Small group/One to one
- Additional time - Review of directions
- Student restates information
- Space for movement or breaks
- Extra visual and verbal cues and prompts, Verbal and visual cues regarding directions and staying on task
- Preferential seating
- Follow a routine/schedule, Rest breaks
- Checklists, Immediate feedback

Specific Strategies and Practices that Support English Language Learners

English language learner (ELL) is a national-origin-minority student who is limited-English-proficient. This term is often preferred over limited-English-proficient (LEP) as it highlights accomplishments rather than deficits.

- Pre-teaching of vocabulary and concepts, Teacher modeling
- Personal Glossary
- Extended Time
- Simplified/Verbal Instructions
- Visual learning- including graphic organizers

Students at Risk of Failure

- Home/School Connection
- Alternative Assessments
- Learning Contracts
- Leveled Rubrics and Tiered Activities
- Work Alone Choice, Group Work Choice

Students with 504 Plans

- Teachers are responsible for implementing designated services and strategies identified on a student’s 504 Plan.
- 504 plans are formal plans that schools develop to give kids the support they need and covers any condition that limits daily activities in a major way.
- Students' accommodations are outlined in their individual 504 plan.

Specific Strategies and Practices that Support Gifted & Talented Students

It is critical that all teachers are able to recognize a high-ability student who may need more depth and complexity in instruction.

- Homogeneous Grouping
- Small Group In-Depth Instruction
- Differentiated Online Practice
- Alternative Assessments
- Pre-Assess to provide Differentiated Instruction to Accelerate Learning
- Supplemental Reading
- Engaging projects