Catasauqua Area School District
Planned Course of Study

Course Title: Future Ready/STEAM

Grade Level(s): 6

Course Description

The class is designed to engage all students in real world, hands-on, collaborative learning applying concepts of science, technology, engineering, arts and mathematics. Students will have an understanding of the history and importance of computer science as we prepare them for the future. Students will use computer programming to complete tasks and solve problems related to the real world.

During the course students will also be immersed in an exploratory learning environment where they will gain further depth of knowledge while building on life skills. Students will self-evaluate, reflecting upon their progress, points of interest, experiences, and talents.

Essential Questions & Competencies

What is technology and how does it work?
How can I use computer programming to complete a task?
How are computers used to solve problems in the real world?
What are the connections between computer science and other subject areas?
How do computer science skills help prepare students for success in careers?

Engage in public discussion on computer science topics.
Develop as learners, users, and creators of computer science.
Understand the importance of computing and technology in the real world.
Prepare for the future and workplace.

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Course Syllabus

Course Content	Tentative Timeframe	National Standards CSTA	State Standards
Code.org	10 days	1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17 1B-DA-06 1B-DA-07 1B-NI-04 1B-NI-05 1B-IC-18 1B-IC-20 1B-IC-21	1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17 1B-DA-06 1B-DA-07 1B-NI-04 1B-NI-05 1B-IC-18 1B-IC-20 1B-IC-21
Makey Makey	4 days	2-CS-01 2-CS-02 2-CS-03	2-CS-01 2-CS-02 2-CS-03
Everfi Character Playbook	6 days	2-IC-20 2-IC-23 1B-NI-04 2A.B.C.D 3A.B	2-IC-20 2-IC-23 1B-NI-04 2A.B.C.D 3A.B ST 4.1 ST 5.1.2.4 ST-ET3.1.2.4 ST-ET 5.1.2

			13.1.5 13.2.5 13.3.5 13.4.5
STEAM Challenges Balloon powered car & constructing plane	5 days	2-AP-17 2-AP-18 2-AP-19 2.AP.12 2.AP.13	3.4.5.C1 3.4.6.C1 3.4.7.C1 3.4.8.C1 3.4.5.C2 3.4.6.C2 3.4.7.C2 3.4.8.C2 2-AP-17 2-AP-18 2-AP-19 2.AP.12 2.AP.13
Common Sense Media - Digital Citizenship	6 days	2-IC-20 2-IC-21 2-IC-22 2-IC-23	2-IC-20 2-IC-21 2-IC-22 2-IC-23
Littlebits	3 days	2-CS-01 2-CS-02 2-CS-03 1-AP-12 2-AP-14	2-CS-01 2-CS-02 2-CS-03 1-AP-12 2-AP-14 3.2.4.B4 3.2.5.B2 3.2.6.B2
Snap Circuits	3 days	2.AP.12	3.4.5.E3 3.4.6.E3 4-PS3-2 4-PS3-4
Sphero Robots	3 days	2.AP.12 2.AP.13 2-AP-17 2-AP-18 2-AP-19 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16	2.AP.12 2.AP.13 2-AP-17 2-AP-18 2-AP-19 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17

		1B-AP-17	3.4.5.C1 3.4.6.C1 3.4.5.C2 3.4.6.C2
Challenges/games	Time Permitting		

Teaching Strategies Utilized

Direct Instruction

Individualized Instruction

Modeling

Simulations

Cooperative Learning

Class Discussions

Peer Tutoring

Testing of products

Use of online learning

Google classroom

Google assessments

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: • *Use functions to simplify complex programs.* • *Use predetermined functions to complete commonly repeated tasks.* • *Define "sprite" as a character or object on the screen that can be moved and changed.* • *Create new sprites and assign them costumes and behaviors.* • *Identify actions that correlate to input events.* • *Create an interactive animation using sprites, behaviors, and events.* • *Identify the benefits of using a loop structure instead of manual repetition.* • *Differentiate between commands that need to be repeated in loops and commands that should be used on their own.* • *Break complex tasks into smaller repeatable sections.* • *Recognize large repeated patterns as made from smaller repeated patterns.* • *Identify the benefits of using a loop structure instead of manual repetition.* • *Identify variables and determine their values.* • *Define and call variables in the context of real-life activities.* • *Create situations which require the use of variables.* • *Assign values to existing variables.* • *Utilize variables in place of repetitive values inside of a program.* • *Identify areas where they can use variables to modify quantities during runtime.* • *Examine code to find places where variables can be substituted for specific values.* • *Assign values to existing variables.* • *Utilize variables in place of repetitive values inside of a program.* • *Use variables to change values inside of a loop.* • *Use a computer simulation to collect data about a model* • *Create double line graph to compare data about two different sources* • *Make and test a prediction by modifying simulation variables* • *Determine starting value, stopping value, and stepping value for a `for` loop.*	AW K AP M R	Code.org **Functions in Minecraft:** Students will begin to understand how functions can be helpful in this fun and interactive Minecraft adventure! Students will learn sprites and behaviors. Sprites are characters or objects on the screen that students can move, change, and manipulate. Behaviors are actions that sprites will take continuously until they are stopped. **Alien Dance Party:** Students can create their own interactive animations and games. In addition to behaviors, students will incorporate user input as events to create an "alien dance party". **Drawing with Loops:** Make their own gorgeous designs using a small number of blocks and digital stickers! **Nested Loops in a Maze:** Program a loop to be inside of another loop. **Variables with Artists:**	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17 1B-DA-06 1B-DA-07 1B-NI-04 1B-NI-05 1B-IC-18 1B-IC-20 1B-IC-21	1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17 1B-DA-06 1B-DA-07 1B-NI-04 1B-NI-05 1B-IC-18 1B-IC-20 1B-IC-21

• *Illustrate the counter values hit each time through a for loop during runtime.* • *Determine starting value, stopping value, and stepping value for a `for` loop.* • *Recognize when to use a `for` loop and when to use other loops such as `repeat` and `while` loops.* • *Use `for` loops to change loop several times with different values.* • *Recognize when to use a `for` loop and when to use other loops such as `repeat` and `while` loops.* • *Learn about the complexity of sending messages over the internet.* • *Translate URLs into IP Addresses.* • *Identify actions that correlate to input events.* • *Create an animated, interactive game using sequence and events.* • *Create an interactive virtual pet using events, behaviors, variables, and custom art.* • *Program solutions to problems that arise when designing a virtual pet, like feeding it or monitoring its energy.* • *Empathize with those who have received mean and hurtful messages.* • *Judge what it means to cross the line from harmless to harmful communication online.* • *Generate solutions for dealing with cyberbullying.* • *Identify a large task that needs to be done.* • *Rearrange a large task into several smaller tasks.* • *Build a complete solution from several smaller solutions.* • *Interpret ethical sharing of copyrighted material vs. sharing that is not ethical.* • *Understand their own rights regarding materials that they have created*		Use variables to make code easier to write and easier to read. make programs more powerful by allowing values to change while the code is running. Students will freeplay level to show what they have learned and create their own designs. Students begin by reviewing loops from previous lessons, then they'll walk through an introduction to for loops so they can more effectively solve complicated problems. **Behaviors in Sprite Lab:** Students will use Sprite Lab to create their own customized behaviors. Students will create an interactive Virtual Pet that looks and behaves how they wish. Digital Sharing: Draw a character sketch.			

Resources/Materials

Computers, iPads, code.org

Interdisciplinary Relationships

Common Core English Language Arts Standards
- L - Language
- SL - Speaking & Listening
- W - Writing

Common Core Math Standards
- G - Geometry
- MP - Math Practices
- NBT - Number And Operations In Base Ten

Next Generation Science Standard
- ETS - Engineering in the Sciences

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Grade Level: 6

Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: *Complete circuit challenges. Create simple circuits with LEDs and Makey Makey.* *Create switches with playdoh, paper clips, pennies, and other conductive resources.* *Engage in simple electronics.* *To create with technology rather than just consume it.* *Create a logical sequence in Scratch to be played in the real world*	AW K AP M R	**Makey Makey** Turn conductive materials (food/play-doh/metals) into keys that respond as the keyboard to the computer. Using interactive websites students can then play games, or on-screen instruments using these conductive material "keyboards" (i.e. bananas become a piano; play-doh can be formed into arrow shapes and used as a game controller). Grounding bracelets are created so that students don't have to hold onto one end of a wire to complete the Makey Makey circuit	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2-CS-01 2-CS-02 2-CS-03	2-CS-01 2-CS-02 2-CS-03

Resources/Materials

Makey Makey, Google Scratch, Computers, Conductors, Tape, Cardboard

Interdisciplinary Relationships

Engineering, Circuitry, Science

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: ● *Assess external influences* ● *Identify personal qualities, strengths, and goals* ● Identify and label emotions ● Understand the role emotions play in gaining greater self-awareness ● Demonstrate effective strategies for managing and expressing emotions ● Define external factors that affect emotions ● Identify barriers to communication ● Understand how nonverbal cues can impact messages sent and received ● Understand appropriate digital communication channels ● Build active listening skills ● *Recognize the value of diverse perspectives* ● *Recognize different types of conflict and why they occur* ● *Identify types of resolutions and resolution strategies* ● *Identify when to bring in a third party to achieve a solution* ● *Determine the qualities of a healthy relationship* ● *Understand the role that boundaries play in healthy relationships*	AW K AP M R	**Everfi - Character Playbook** worksheets, reading, computer/Ipad, video, reflections, scenarios **Analyzing Influences** Form a positive self-image and will distinguish their unique perspective from external influences in order to make smart decisions. **Understanding and Managing Emotions:** Learn how to build and maintain healthy relationships by understanding how others feel and by understanding, managing, and expressing their own emotions. **Communicating Effectively:** Use communication and social skills to interact effectively with others, including practicing safe and smart digital communication activities. **Resolving Conflicts:** Demonstrate positive ways to communicate perspectives while maintaining relationships in order to avoid and manage conflicts.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Analyze scenarios Google quizzes Informal/formal assessments Teacher observations	2-IC-20 2-IC-23 1B-NI-04 2A.B.C.D 3A.B	2-IC-20 2-IC-23 1B-NI-04 2A.B.C.D 3A.B ST 4.1 ST 5.1.2.4 ST-ET3.1.2.4 ST-ET 5.1.2 13.1.5 13.2.5 13.3.5 13.4.5

• *Identify the ways in which power and control affect relationships* • *Demonstrate effective bystander intervention techniques when healthy boundaries are crossed* • *Identify which decisions will significantly impact relationships* • *Make decisions based on moral, personal, and ethical standards* • *Apply decision-making skills to deal responsibly with academic and social factors* • *Recognize the effect of daily decisions on personal success and well-being*		Learn techniques to avoid and manage conflicts, both internally and with others. **Stepping In:** Recognize compassion within themselves and take action when experiencing or witnessing an unhealthy relationship. **Making Decisions:** Learn how to make sound decisions through the six steps of a decision diagram.			

Resources/Materials

Computers, iPads, EVERFI, Worksheets, Google Quizzes

Interdisciplinary Relationships

Common Career Technical Core, Common Core State Standards (Practices), Next Generation Science Standards, Code.org/CSTA Standards
Common Career Technical Core
Analyzing and interpreting data
CCSS.MATH.CONTENT.6.EE.C.9: Represent and analyze quantitative relationships between dependent and independent variables
CCSS.MATH.CONTENT.7.SP.C: Investigate chance processes and develop, use, and evaluate probability models*
CCSS.MATH.CONTENT.8.SP.A: Investigate patterns of association in bivariate data*
NGSS Practice 1: Asking questions (for science) and defining problems (for engineering)

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The student will be able to: • *Learn about civil engineering.* • *Learn about engineering design.* • *Learn about planning and construction.* • *Learn about teamwork and working in groups.* • *To investigate Newton's third law of motion by designing and constructing rocket-powered racing cars.* • *To experiment with ways of increasing the distance the car travels.* • *Design at least two different paper airplanes.* • *Modify one of their designed airplanes in an attempt to improve its flight.* • *Become familiar with parts of a paper airplane and how they relate to parts on a real airplane.*	AW K AP M R	STEAM Challenges Balloon powered car & constructing plane: Engineering: construct a car that travels powered by a balloon. Research airplanes and choose a source of medium to construct an airplane. Revisit their idea and constructions to see if they should make any changes	Rubric Work ethic Completion of project Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2-AP-17 2-AP-18 2-AP-19	3.4.5.C1 3.4.6.C1 3.4.7.C1 3.4.8.C1 3.4.5.C2 3.4.6.C2 3.4.7.C2 3.4.8.C2 2-AP-17 2-AP-18 2-AP-19

Resources/Materials

1 balloon, plastic bottle, tape, scissors, straw, wooden skewers, bottle caps

Interdisciplinary Relationships

Science - Force, Accuracy,
Math - Precision and angles
Science & Engineering
Technology & Design

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: ● *Reflect on their common online and offline activities.* ● *Identify ways to "unplug" to maintain balance between online and offline activities.* ● *Use the Digital Habits Checkup routine to create a personal challenge to achieve more media balance.* ● *Compare and contrast identity theft with other kinds of theft.* ● *Describe different ways that identity theft can occur online.* ● *Use message clues to identify examples of phishing.* ● *Reflect on reasons why people might create fake social media accounts.* ● *Identify the possible results of posting from a fake social media account.* ● *Debate the benefits and drawbacks of posting from multiple accounts.* ● *Analyze how well they know the people they interact with online.* ● *Reflect on what information is safe to share with different types of online friends.* ● *Learn to recognize red flag feelings and use the Feelings & Options thinking routine to respond to them.* ● *Reflect on how easily drama can escalate online.* ● *Identify de-escalation strategies when dealing with digital drama.* ● *Reflect on how digital drama can affect not only oneself but also those around us.* ● *Learn reasons that people put false or misleading information on the internet.*	AW K AP M R	Common Sense Media - Digital Citizenship: Student handouts family activities interactive online lessons pair-share videos **Media Balance & Well-Being** Balance digital media use in our lives. **Privacy and security:** Avoid online identity theft and phishing schemes. **Digital Footprint and Identity:** Explore why some people create different or alternate personas for themselves online and on social media. **Relationships and Communication:** Help students consider whom they're talking to and the types of information they're sharing online. **Cyberbullying, digital drama and hate speech:** Learn tips on avoiding online drama in the first	Google quizzes Worksheets Work ethic Completion of activity Use of knowledge gained in the real world Evidence of learning Informal/formal assessments Teacher observations	2-IC-20 2-IC-21 2-IC-22 2-IC-23	2-IC-20 2-IC-21 2-IC-22 2-IC-23

• *Learn criteria for differentiating fake news from credible news.* • *Practice evaluating the credibility of information they find on the internet.*		place and de-escalating drama when it happens. **News and Media Literacy:** Help students dig into why and how false information ends up online in the first place, and then practice evaluating the credibility of what they're finding online.			

Resources/Materials

Computers, iPads, Google Classroom, Commonsense Media

Interdisciplinary Relationships

ELA- News & Media Literacy
Social/Emotional Learning - Cyberbullying

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: • *Students will be able to describe how a circuit works.* • *Students will be able to follow directions to create different kinds of circuits.* • *Students will be able to design their own circuit.* • *<u>Areas emphasized:</u> building, testing, and troubleshooting circuits, and the basic physics of electricity.*	AW K AP M	**Snap Circuits:** Building, testing, and troubleshooting circuits, and the basic physics of electricity. Students will work in teams to build several simple circuits and explore electricity using "Snap Circuits, Jr." kits.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2.AP.12	3.2.4.B4 3.2.5.B2 3.2.6.B2 2.AP.12

Resources/Materials
Instructions on running this activity Powerpoint presentation on electricity and circuits "Snap Circuits, Jr." kits

Interdisciplinary Relationships
Technology/Engineering strand: simple electrical systems Mathematics Science

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The student will be able to: • *Explain how to make a vehicle turn using code blocks.* • *Construct and program a car that can move forward and stop.* • *Write and modify code until it makes a car turn left and right at a specific angle, then modify this code to get the vehicle to go straight for a specified distance.* • *Modify the car to fix any issues or add new functions.*	AW K AP	Littlebits: Build an a-MAZE-ing racer, your own littlebits powered car that can travel through a maze using the code you write.	Work ethic Completion of activity Evidence of learning A log of their invention/exploration process - whether written or through the use of media Informal/formal assessments Teacher observations	2-CS-02 1-AP-12 2-AP-14 3.2.4.B4 3.2.5.B2 3.2.6.B2	2-CS-02 1-AP-12 2-AP-14 3.2.4.B4 3.2.5.B2 3.2.6.B2

Resources/Materials
Code Kit Code Kit Expansion Pack: Technology Tape or any obstacles for the race course Computer or Chromebook with the littleBits Code Kit app

Interdisciplinary Relationships
Computer science/coding, Art/design, Technology & Engineering

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	National Standards CSTA	PA Stand.
The student will be able to: • *Use ipads to control Sphero robots* • *Create a one-line program that moves Sphero at a steady speed for a specified amount of time* • *Create a two-line program to display a color for a certain length of time.* • *Have Sphero light up in colors.* • *Perform measurements to determine the distance traveled.*	AW K AP	Become familiar with sphero robots. Program the sphero to change colors, make sounds, change direction, and change speeds. Sphero football World Cup Learn how cloth face coverings can protect against germs! Use BOLT's light sensor and a handmade mask to demonstrate how filtering inputs can help slow the spread of germ transmission. Create a mask for your BOLT using single sheets of tissue paper. Add or remove layers to create the ideal mask to limit the amount of light that reaches the ambient light sensor.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2.AP.12 2.AP.13 2-AP-17 2-AP-18 2-AP-19 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17	2.AP.12 2.AP.13 2-AP-17 2-AP-18 2-AP-19 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-14 1B-AP-08 1B-AP-09 1B-AP-10 1B-AP-11 1B-AP-12 1B-AP-13 1B-AP-14 1B-AP-15 1B-AP-16 1B-AP-17 3.4.5.C1 3.4.6.C1 3.4.5.C2 3.4.6.C2

Resources/Materials

Sphero robots, computers, ipads, tape, a large space, 2 goals, barriers

Interdisciplinary Relationships

Mathematics
Art
Engineering & Design
Science & Technology