Catasauqua Area School District
Planned Course of Study

Course Title: Future Ready/STEAM

Grade Level(s): 8

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
Google Scratch	3 days	2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-15 2-AP-16 2-AP-18 2-AP-19	2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-15 2-AP-16 2-AP-18 2-AP-19
Makey Makey 8	2 days	2-CS-01 2-CS-02 2-CS-03	2-CS-01 2-CS-02 2-CS-03
Everfi 8th - Ignition and Venture	8th - 10 days	2-IC-20 2-IC-23	2-IC-20 2-IC-23

		1B-NI-04	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 8th - Bridge Building (popsicle sticks)	5 days	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	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
Tinkercad with 3D printing (7th and 8th)	8th - 5 days	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-10	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-10
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	Assess. Anchor	PA Stand.
The student will be able to: ● *Develop programs that respond to timed events* ● *Develop programs that respond to user input* ● *Create dance animations with code* ● *Translate movements into a series of commands.* ● *Identify and locate bugs in a program.* ● *Predict where a program will fail.* ● *Modify an existing program to solve errors.* ● *Reflect on the debugging process in an age-appropriate way.* ● *Order movement commands as sequential steps in a program.* ● *Represent an algorithm as a computer program.* ● *Develop problem solving and critical thinking skills by reviewing debugging practices.* ● *Create a program to complete an image using sequential steps.* ● *Break complex shapes into simple parts.* ● *Identify the benefits of using a loop structure instead of manual repetition.* ● *Break down a long sequence of instructions into the largest repeatable sequence.* ● *Employ a combination of sequential and looped commands to reach the end of a maze.* ● *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.*	AW K AP M R	Code.org students will program their own interactive dance party. This activity requires sound as the tool was built to respond to music. students will develop sequential algorithms to move a bird from one side of a maze to the pig at the other side. students will encounter puzzles that have been solved incorrectly. They will need to step through the existing code to identify errors, including incorrect loops, missing blocks, extra blocks, and blocks that are out of order. students will take control of the Artist to complete drawings on the screen. students will be using loops to help BB-8 traverse a maze more efficiently than before. students will learn how to program a loop to be inside of another loop.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	IA-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

• *Break apart code into the largest repeatable sequences using both loops and nested loops.* • *Recognize the difference between using a loop and a nested loop.* • *Describe when a loop, nested loop, or no loop is needed.* • *Define circumstances when certain parts of a program should run and when they shouldn't.* • *Determine whether a conditional is met based on criteria.* • *Translate spoken language conditional statements into a program.* • *Solve puzzles using a combination of looped sequences and conditionals.* • *Distinguish between loops that repeat a fixed number of times and loops that repeat as long as a condition is true.* • *Use a while loop to create programs that can solve problems with unknown values.* • *Define circumstances when certain parts of a program should run and when they shouldn't.* • *Determine whether a conditional is met based on criteria.* • *Use functions to simplify complex programs.* • *Use predetermined functions to complete commonly repeated tasks.* • *Recognize when a function could help to simplify a program* • *Categorize and generalize code into useful functions.* • *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.*		Students will get the chance to practice ideas that they have learned up to this point students will begin to code with conditionals, allowing them to write code that functions differently depending on the specific conditions the program encounters. Students will practice while loops, until loops, and if / else statements. students will use functions in new ways by combining them with while loops and if / else statements. Students will be introduced to using functions on Code.org. students will explore the creation of repetitive designs using variables in the Artist environment. Students will learn how variables can be used to make code easier to write and easier to read. After guided puzzles, students will end in a freeplay level to show what they have learned and create their own designs. Learn how to create and edit sprites.			

		Practice making games to share with your friends and family. Learn to program your own sprite behaviors!			

Resources/Materials

Computers, iPads, code.org

Interdisciplinary Relationships

CSTA K-12 Computer Science Standards
Common Core English Language Arts Standards
- L - Language
- SL - Speaking & Listening

Common Core Math Standards
- MP - Math Practices
- G - Geometry
- OA - Operations And Algebraic Thinking
- NBT - Number And Operations In Base Ten
- MD - Measurement And Data

Next Generation Science Standards
- ETS - Engineering in the Sciences

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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: *Program their own interactive stories, games, and animations — and share their creations with others in the online community.* *Think creatively, reason systematically, and work collaboratively — essential skills for life in the 21st century.*	AW K AP M R	Google scratch Play and create games while coding and changing codes.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-15 2-AP-16 2-AP-18 2-AP-19	2-AP-11 2-AP-12 2-AP-13 2-AP-14 2-AP-15 2-AP-16 2-AP-18 2-AP-19
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

Math, LA, Science, Circuitry

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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: *Build a safe and inclusive learning environment* *Differentiate the negative and positive aspects of an online community* *Identify methods to engage with others online in a respectful manner* *Identify methods to create a healthy balance between online and offline time.* *List steps to keep personal information private online.* *Explain what a digital footprint is and how it's created.* *Identify when to seek help from a trusted adult.* *List steps to protect digital data from compromise.* *Differentiate the negative and positive aspects of an online community.* *Identify when to seek help from a trusted adult.* *Describe the potential consequences of spending a lot of time online.* *Identify methods to create a healthy balance between online and offline time* *List steps to keep personal information private online.* *List steps to protect digital data from compromise.* *Differentiate the negative and positive aspects of an online community.* *Identify and describe digital rights and restrictions.*	AW K AP M R	Everfi: Ignition and Venture worksheets, reading, computer/Ipad, video, reflections, scenarios Students take a personal diagnostic and discover how their unique characteristics relate to entrepreneurship. Students research and make important business decisions (hiring, pricing, etc.) that they must justify in writing Students craft an engaging, concise business pitch for their business.	Work ethic Completion of activity Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	2-IC-20 2-IC-23 1B-NI-04 2A.B.C.D	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

Differentiate between created and curated content. *Describe how to evaluate content for accuracy and bias.* *Identify methods to differentiate accurate search results from inaccurate or sponsored content.* *Address the personal side of entrepreneurship, connecting the dots between running a business and being responsible with their own finances.* *Learn about financial decision making, developing and maintaining and balanced budget, income, taxes, variable and fixed expenses, and the best payment types for different transactions.* *Explore characteristics of successful entrepreneurs.* *Explore key business concepts and apply them within a food truck business simulation.* *Draw on previous lessons and what they learn about the four elements of a successful business pitch.*					

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.*	AW K AP M R	Build a bridge out of popsicle sticks test the strength of their products	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
Popsicle sticks, Computer, Glue, Glue guns, Press machine

Interdisciplinary Relationships
Math, Science, Art, Engineering, Technology Physical Science Science and Technology Science in Personal and Social Perspectives

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The student will be able to: *Apply design thinking methods to a real-world problem.* *Practice design and technical skills in a fun and nurturing environment.* *Develop an entrepreneurial mindset in communicating ideas.*	AW K AP M R	Tinkercad 3D printing Name ways people have used 3D printing. Students will manipulate objects by size, shape, rotation, movement, viewing, and placement. Find a repetitive pattern in code and use a loop. Save and use information in a variable. Design something to be beneficial to the classroom.	Rubric Work ethic Completion of project Use of knowledge gained in real world projects Evidence of learning Informal/formal assessments Teacher observations	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-10	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-10

Resources/Materials
3D printer, tinkercad, computers

Interdisciplinary Relationships
Science - Force, accuracy Math - Precision and angles Art Engineering & Design Science & Technology