Catasauqua Area School District
Planned Course of Study

Course Title: STEAM

Grade Level(s): K-2

Text: Code.org, Apple Everyone Can Create: Early Learners

Course Description

The Kindergarten through 2nd grade STEAM program aims to provide students with engaging and rigorous learning opportunities to develop 21st century skills. Students will explore their unique perspectives both as individuals and within groups of their peers.

A main goal of instruction during these years is to have students become comfortable with failure. To understand that failure is a part of a process towards a solution which can generate better ideas, improved creativity and, ultimately in their future, better design. This new understanding of failure will come in the form of Play, where students are free to explore in an open way as children naturally do. This idea of Play will continue to 3rd and 4th grade as philosophies around Maker Education are introduced.

The STEAM program will also introduce Computer Science as a major part of the curriculum. Computer Science lessons will give students the opportunity to interact and create with technology in new ways. With these developing skills, students will not be simply digital consumers, but move towards digital producers and creators.

Essential Questions & Competencies

Essential Questions:

- What is technology and how do we use it?
- How does a computer work?
- How can we use a computer as a tool to create things or solve problems?
- How does technology affect our everyday lives?
- How do artists and designers learn from trial and error?

Competencies:

- Creativity is a skill that can be developed, honed and improved upon.
- Apply skills necessary to conduct an experiment or design a solution to solve a problem.
- Understand how all subjects in school are connected to one another. Knowing this can help us solve problems and better understand our world.
- The process of developing computational artifacts embraces both creative expression and the exploration of ideas to create prototypes and solve computational problems. Examples of computational artifacts include programs, simulations, visualizations, digital animations, robotic systems, and apps.
- Individual aesthetic and empathetic awareness developed through engagement with art can lead to understanding and appreciation of self, others, the natural world, and constructed environments.

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Course Syllabus

Course Content	Tentative Timeframe	National Standards	State Standards
Code.org	Throughout School Year	CSTA: 1A-CS-01 1A-CS-02 1A-CS-03 1A-NI-04 1A-DA-05 1A-DA-06 1A-DA-07 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-13 1A-AP-14 1A-AP-15 1A-IC-16 1A-IC-17 1A-IC-18	Computer Science: 1A-CS-01 1A-CS-02 1A-CS-03 1A-NI-04 1A-DA-05 1A-DA-06 1A-DA-07 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-13 1A-AP-14 1A-AP-15 1A-IC-16 1A-IC-17 1A-IC-18
Early Robotics ● Bee Bots ● Ozobots ● Cubelets ● LEGO WeDo	5 Lessons	CSTA: 1A-AP-08 1A-AP-10 1A-AP-11 1A-AP-15 1A-IC-16	Technology & Engineering 3.4.3.A3 3.4.3.B1 3.4.3.E1 3.4.3.E3 3.4.3.E4 3.4.3.E6
Digital Art ● Drawing ● Photography ● Video	First Grade: 4 Lessons Second Grade: 6 Lessons	Visual Arts: Cr1.2.2a Cr2.2.2a Pr6.1.2a Re9.1.2a Cn10.1.2a	Visual Arts: 9.1.3.A 9.1.3.C 9.1.3.H 9.1.3.J 9.3.3.A 9.4.3.A
Engineering ● KEVA Planks ● Design Challenges	3 Lessons	Assessment Anchor:	Technology & Engineering

		Technology & Engineering: S3.A.2.1	3.4.3.A3 3.4.3.C1 3.4.3.C2 3.4.3.C3 3.4.3.D1 3.4.3.D2 3.4.3.D3

Teaching Strategies Utilized

- Direct Instruction
- Individualized Instruction
- Differentiated Instruction
- Class Discussion
- Cooperative Learning
- Online Learning
- Inquiry Based Learning
- Maker Centered Learning

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Objectives	Level of Ach.	Suggested Learning Activities	Forms of Assessment	CSTA Stand.	PA Stand.
The student will be able to understand: *Computing Systems* ● *Devices* ● *Hardware and Software* ● *Troubleshooting* *Networks and the Internet* ● *Cybersecurity* *Data and Analysis* ● *Storage* ● *Collection, Visualization, & Transformation* ● *Inference & Models* *Algorithms and Programming* ● *Algorithms* ● *Variables* ● *Control* ● *Modularity* ● *Program Development* *Impacts of Computing* ● *Culture* ● *Social Interactions* ● *Safety, Law & Ethics*	AW K AP M	Lessons taken from Code.org Kindergarten: Course A ● Safety in My Online Neighborhood ● Learn to Drag and Drop ● Happy Maps ● Sequencing with Scrat ● Programming with Scrat ● Programming with Rey and BB-8 ● Happy Loops ● Loops with Scrat ● Loops with Laurel ● Ocean Scene with Loops ● The Big Event Jr. ● On the Move with Events 1st Grade: Course B ● Digital Trails ● Move It, Move It ● Sequencing with Angry Birds ● Programming with Angry Birds ● Programming with Harvester ● Getting Loopy ● Loops with Harvester ● Loops with Laurel ● Drawing Gardens with Loops ● The Right App ● A Royal Battle with Events 2nd Grade: Course C ● Putting a STOP to Online Meanness ● Password Power Up ● My Robotic Friends Jr. ● Programming with Angry Birds ● Debugging in Maze	Group Discussion Teacher Observation Lesson completion in Code.org Student Self Assessment Rubrics	1A-CS-01 1A-CS-02 1A-CS-03 1A-NI-04 1A-DA-05 1A-DA-06 1A-DA-07 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-13 1A-AP-14 1A-AP-15 1A-IC-16 1A-IC-17 1A-IC-18	1A-CS-01 1A-CS-02 1A-CS-03 1A-NI-04 1A-DA-05 1A-DA-06 1A-DA-07 1A-AP-08 1A-AP-09 1A-AP-10 1A-AP-11 1A-AP-12 1A-AP-13 1A-AP-14 1A-AP-15 1A-IC-16 1A-IC-17 1A-IC-18

		● Collecting Treasure with Laurel ● Creating Art with Code ● Binary Bracelets ● My Loopy Robotic Friends Jr. ● Loops with Rey and BB-8 ● Harvesting Crops with Loops ● Sticker Art with Loops ● The Big Event ● Build a Flappy Game ● Chase Game with Events ● Picturing Data ● End of Course Project			

Resources/Materials

- Code.org
- Unplugged Activities
- Supporting online videos
- Student MacBooks and iPads

Interdisciplinary Relationships

Next Generation Science Standards:

- ETS - Engineering in the Sciences
    - ETS1 - Engineering Design
        - K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
        - K-2-ETS1-2 - Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Common Core Math Standards

- MD - Measurement And Data
    - 2.MD.10 - Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put- together, take-apart, and compare problems4 using information presented in a bar graph.

Career Education and Work

- Career Awareness and Preparation
- Career Retention and Advancement
- Entrepreneurship

21st Century Skills

- Creativity and Innovation
- Critical Thinking and Problem Solving
- Communication and Collaboration
- Flexibility and Adaptability
- Informations, Communications & Technology Literacy
- Initiative and Self-Direction
- Productivity and Accountability
- Leadership and Responsibility
- Environmental Literacy

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The student will be able to: *Utilize computer science skills developed in Code.org to control a robot. Challenges include navigating through mazes, developing algorithms, and developing simple robots to perform tasks.* *Students will also discuss the interaction of humans and robotics in the real word. Beginning to understand how robotics has changed industry, commerce and the workforce.*	AW K AP M	Kindergarten: ● BeeBots First Grade: ● OzoBots 2nd Grade: ● OzoBots ● Cubelets ● LEGO WeDo	Group Discussion Teacher Observation Student Self Assessment Rubrics	CSTA: 1A-AP-08 1A-AP-10 1A-AP-11 1A-AP-15 1A-IC-16	Technology & Engineering 3.4.3.A3 3.4.3.B1 3.4.3.E1 3.4.3.E3 3.4.3.E4 3.4.3.E6

Resources/Materials

- Bee Bots
- OzoBots
- Cubelets
- LEGO WeDo
- Student iPads
- Pencils, markers

Interdisciplinary Relationships

- English Language Arts
  - Writing
  - Speaking and Listening
- Mathematics
  - Geometry
  - Measurement
- Science
  - Physics (Energy)
- Career Education and Work
  - Career Awareness and Preparation
  - Career Retention and Advancement
  - Entrepreneurship
- 21st Century Skills
  - Creativity and Innovation
  - Critical Thinking and Problem Solving
  - Communication and Collaboration
  - Flexibility and Adaptability
  - Informations, Communications & Technology Literacy
  - Initiative and Self-Direction
  - Productivity and Accountability
  - Leadership and Responsibility
  - Environmental Literacy

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The student will be able to: *Utilize applications and online tools to create unique forms of digital Art & Design.* *Understand the role of technology in Contemporary Art.* *Explore how Art can serve as a form of self expression and discovery.*	AW K AP M	Activities taken from Apple's Everyone Can Create: Early Learners Curriculum First Grade: Drawing ● Patterns ● Things ● People ● Places 2nd Grade: Photography & Video ● People and Things ● Light and Shadow ● Edit Photographs ● Introduce Yourself ● Slow Motion ● Tell a Story	Group Discussion Teacher Observation Student Self Assessment Rubrics	Visual Arts: Cr1.2.2a Cr2.2.2a Pr6.1.2a Re9.1.2a Cn10.1.2a	Visual Arts: 9.1.3.A 9.1.3.C 9.1.3.H 9.1.3.J 9.3.3.A 9.4.3.A

Resources/Materials

- Apple's Everyone Can Create: Early Learners Curriculum
- Student iPads

Interdisciplinary Relationships

- English Language Arts
  - Writing
  - Speaking and Listening
- Career Education and Work
  - Career Awareness and Preparation
  - Career Retention and Advancement
  - Entrepreneurship
- 21st Century Skills
  - Creativity and Innovation
  - Critical Thinking and Problem Solving
  - Communication and Collaboration
  - Flexibility and Adaptability
  - Informations, Communications & Technology Literacy
  - Initiative and Self-Direction
  - Productivity and Accountability
  - Leadership and Responsibility
  - Environmental Literacy

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The student will be able to: *Engineering lessons in this course help students develop spatial reasoning, collaboration and creativity skills. These activities engage students with challenges that look for unique solutions.* *Students will form an understanding of a "fast fail" or "fail forward" philosophy in which failures are not seen as set backs, but rather an integral part of the journey of growth and solutions.* *Students will build skills of communication, collaboration and teamwork within small groups of their peers.*	AW K AP M	Kindergarten: ● KEVA Planks ● STEM Challenges First Grade: ● KEVA Planks ● STEM Challenges Second Grade: ● KEVA Planks ● LEGO ● STEM Challenges	Group Discussion Teacher Observation Student Self Assessment Rubrics	Technology & Engineering: S3.A.2.1	Technology & Engineering 3.4.3.A3 3.4.3.C1 3.4.3.C2 3.4.3.C3 3.4.3.D1 3.4.3.D2 3.4.3.D3

Resources/Materials

- KEVA Planks
- LEGO Bricks
- LEGO WeDo
- Student iPads
- Various household materials (STEM Challenges)

Interdisciplinary Relationships

- English Language Arts
  - Writing
  - Speaking and Listening
- Mathematics
  - Geometry
  - Measurement
- Science
  - Physics (Energy)
- Career Education and Work
  - Career Awareness and Preparation
  - Career Retention and Advancement
  - Entrepreneurship
- 21st Century Skills
  - Creativity and Innovation
  - Critical Thinking and Problem Solving
  - Communication and Collaboration
  - Flexibility and Adaptability
  - Initiative and Self-Direction
  - Productivity and Accountability
  - Leadership and Responsibility
  - Environmental Literacy