

Course Overview:

Computer Science is an extension course that builds off what students learned in 6th Grade Info Tech. There's a quick review of block coding and moves quickly into "script" coding. Some of the topics that are studied in this course are using HTML to design a webpage, using The Engineer Design Process to construct a Roller Coaster, Edison and Sphero Robots, and other topics related to Computer Science.

Standards:

- 1B-AP-08** Model daily processes by creating and following algorithms (sets of step-by-step instructions) to complete tasks
- 1B-AP-11** Decompose (break down) the steps needed to solve a problem into a precise sequence of instructions.
- 1B-AP-12** Modify, remix, or incorporate portions of an existing program into one's own work, to develop something new or add more advanced features.
- 1B-AP-15** Test and debug (identify and fix errors) a program or algorithm to ensure it runs as intended.
- 1B-IC-16** Compare how people live and work before and after the implementation or adoption of new computing technology.
- 1B-IC-21** Use public domain or creative commons media, and refrain from copying or using material created by others without permission.
- 1B-NI-05** Discuss real-world cybersecurity problems and how personal information can be protected
- 1B-CS-01** Describe how internal and external parts of computing devices function to form a system.
- 1B-CS-02** Model how computer hardware and software work together as a system to accomplish tasks.
- 2-AP-10** Use flowcharts and/or pseudocode to address complex problems as algorithms.
- 2-AP-13** Decompose problems and subproblems into parts to facilitate the design, implementation, and review of programs.
- 2-AP-16** Incorporate existing code, media, and libraries into original programs, and give attribution.
- 2-AP-17** Systematically test and refine programs using a range of test cases.
- 2-AP-18** Distribute tasks and maintain a project timeline when collaboratively developing computational artifacts.
- 2-AP-19** Document programs in order to make them easier to follow, test, and debug.
- 2-IC-20** Compare tradeoffs associated with computing technologies that affect people's everyday activities and career options.
- 2-IC-21** Discuss issues of bias and accessibility in the design of existing technologies.
- 2-IC-23** Describe tradeoffs between allowing information to be public and keeping information private and secure.

3A-AP-20 Evaluate licenses that limit or restrict use of computational artifacts when using resources such as libraries.

3A-DA-12 Create computational models that represent the relationships among different elements of data collected from a phenomenon or process.

3B-DA-05 Use data analysis tools and techniques to identify patterns in data representing complex systems

MS-ETS1-1. Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.

MS-ETS1-2. Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.

MS-ETS1-3. Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.

MS-ETS1-4. Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Course Materials:

- Code.org
- Code Monkey
- Edison and Sphero Robots
- Materials for building projects (Varies by group)
- Laptop and internet access

Course Outline:

Week 1-2

- **Computer Science Webquest**
- **Problem Solving Process Activities**

Week 3-8

- **Introduction to HTML**
- **Introduction to CSS**
- **Create Webpage**
- **Insert and style images**
- **CSS Rule Sets**
- **Finalize Webpage**
- **Peer Review**

Week 8-9

- **Engineer Design Process**
- **Design Roller Coaster Project**
- **Construct Roller Coaster**
- **Peer Review**

Week 10-12

- **Introduction to Artificial Intelligence (AI)**
- **Supervised and Unsupervised Learning**
- **Neural Networks**
- **Effects on Society**
- **AI Lab to train a bot**
- **Use and evaluate different types of AI and their accuracy**

Week 13-16

- **Introduction to Edison Robots**
- **Use barcode to program**
- **Use Edblocks to program**

Week 17-19

- **Sphero Robots**
- **Complete Challenges**
- **Design and create a new obstacle course, mini golf hole, maze, etc. for Sphero to complete**

Week 20-21

- **Reflect on Semester**
- **Create a final project to review what was learned**
- **Presentations**