Coding curriculum Grade 1-12

# Why Coding

Coding fosters creativity and teaches students critical thinking skills to become proactive learners.

# Research

- Six different studies show: children who study computer science perform better in other subjects, excel at problem-solving, and are 17% more likely to attend college.
- Recent research also demonstrates positive links between learning computer science with Coding and reading comprehension, problem-solving, and planning skills. Students with resourceful teachers scored higher on standardized reading comprehension exams when they did extra Coding activities. Coding students also outperformed other STEM students at problem-solving executive function and planning skills.

# Elementary school

| 1st Grade | 2nd Grade | 3rd Grade | 4th Grade | 5th Grade |
|---|---|---|---|---|
| Course A | Course B | Course C | Course D | Course E |

- The progression of Courses A-E build upon each other to ensure continuing students stay interested and learn new things.
- This allows teacher to use the same course at any grade level for all students, regardless of their experience.
- All courses make suitable entry points for students.
- Later courses feature “ramp up” lessons which are intended to introduce or review important concepts from previous courses at an accelerated pace.

# Course A

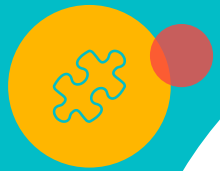
Learn the basics of computer science and internet safety.

# Course B

Create programs with sequencing, loops, and events. Translate your initials into binary, investigate different problem-solving techniques, and learn how to respond to cyberbullying.

# Course C

Students develop their understanding of loops, conditionals, and events. Beyond coding, students learn about digital citizenship.



# Course D

Start coding with algorithms, loops, conditionals, and events and then you'll move on functions.

# Course E

Investigate different problem-solving techniques and discuss societal impacts of computing and the internet.

# Grade 6-10

It is an introductory computer science course that empowers students to create authentic artifacts and engage with computer science as a medium for creativity, communication, problem solving, and fun.

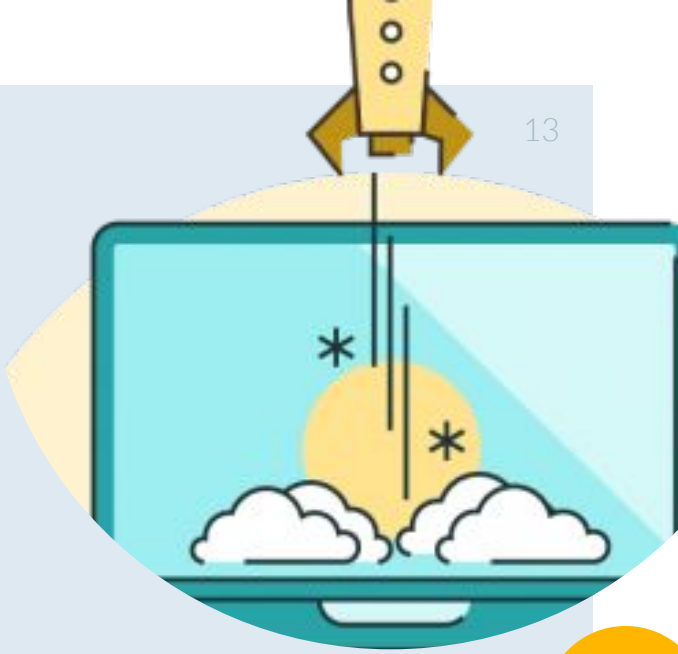
# Problem Solving and Computing


Problem Solving and Computing is a highly interactive and collaborative introduction to the field of computer science, as framed within the broader pursuit of solving problems. Students practice using a problem solving process to address a series of puzzles, challenges, and real world scenarios. Next, students will learn how computers input, output, store, and process information to help humans solve problems.

# Web Development


Students will learn how to create and share the content on their own web pages. After deciding what content students want to share with the world, students will learn how to structure and style their pages using HTML and CSS. students will also practice valuable programming skills such as debugging, using resources, and teamwork.

# Interactive Animations and Games

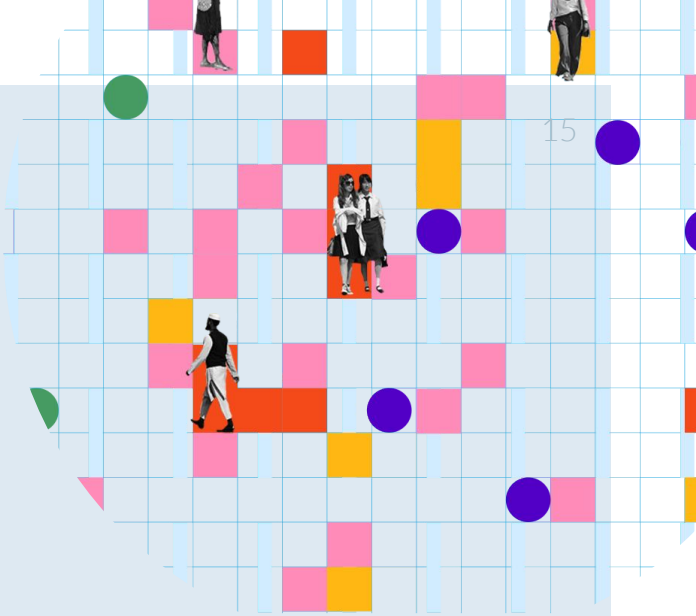


Students will build on their coding experience as there program animations, interactive art, and games. They starts off with simple shapes and builds up to more sophisticated sprite-based games, using the same programming concepts and the design process computer scientists use daily. In the final project, students will develop a personalized, interactive program.

# The Design Process

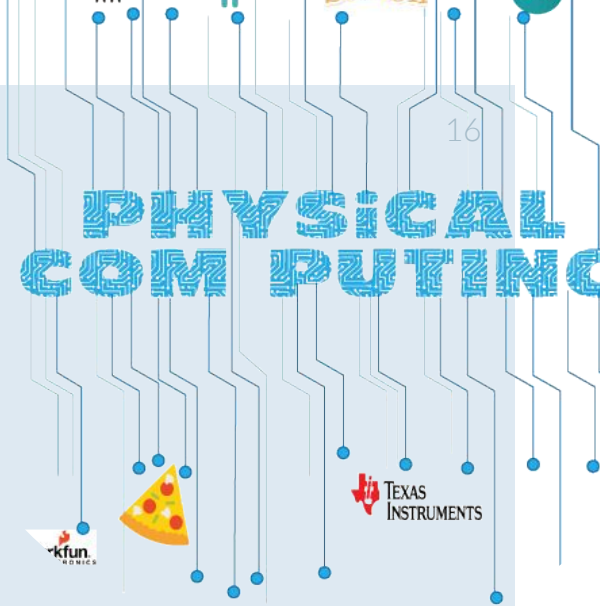

Students will learn how to better understand the needs of others while developing a solution to a problem. The course consists of an iterative team project, during which teams have the opportunity to identify a need that they care about, prototype solutions both on paper and online, and test solutions with real users to get feedback and drive further iteration.

# Data and Society



The importance of data in solving problems and highlights how computers can help in this process. First explores different systems used to represent information in a computer and the challenges and tradeoffs posed by using them. Second students will learn how collections of data are used to solve problems, and how computers help to automate the steps of this process.

# Physical Computing




In this students will explores the role of hardware platforms in computing and how different sensors can provide more effective input and output than the traditional keyboard, mouse, and monitor. Using online and Circuit Playground, student will develop programs that utilize the same hardware inputs and outputs that you see in the smart devices, looking at how a simple rough prototype can lead to a finished product.

# Grade 9-12

Computer Science Principles covers many topics including the Internet, Big Data and Privacy, and Programming and Algorithms.

# Digital Information

The technical challenges and questions that arise from the need to represent digital information in computers. Students will learn how complex information like numbers, text, images, and sound are represented in text, how compression works, and the broader social impacts of digitizing the world's information.

# The Internet

How the Internet was designed to connect billions of devices and people to one another. Student will learn how the different protocols of the Internet work and actually build them yourself using the Internet Simulator. Then consider the impacts the Internet has had, both good and bad, on modern life.

# Intro to App Design

This is an introduction to programming and app design with a heavy focus on important skills like debugging, pair programming, and user testing. Student learn how to design user interfaces and write event-driven programs in online platform and then design a project that teaches their classmates about a topic of your choosing.

# Variables, Conditionals, and Functions

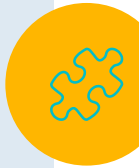
This will explores how variables, conditionals, and functions allow for the design of increasingly complex apps. Student will learn how to program with these three new concepts through a sequence of collaborative activities.

# Lists, Loops, and Traversals

This topic introduces lists, loops, and traversals, and explores the way they can be used to build apps that store and process large amounts of information. Student will learn to program with the data library in online platform.

# Algorithms

It is a quick exploration of how computer scientists design algorithms to solve problems and how they analyze the speed of different algorithms. Student will learn about the concept of algorithmic efficiency through a variety of hands-on activities and learn how it's being applied in modern computing.



# Parameters, Return, and Libraries

Introduces parameters, return, and libraries. Student will learn how to use these concepts to build new kinds of apps as well as libraries of code that you can share with student classmates. End the unit by designing a library of functions around any topic of your choosing.

# Data

Student will learn how data analysis helps turn raw data into useful information about the world. They will learn how to use data visualization to find patterns inside of data sets and learn how this data analysis process is being used in contexts like open data or machine learning to help make decisions or learn more about our world.

# Cybersecurity and Global Impacts

Student will learn how computing innovations have impacted our world in beneficial and harmful ways. They will learn how data can pose a threat to our privacy and security, and the ways that encryption and other techniques are used to complete it. Throughout participate in a "school of the future" conference in which you and a team make a proposal for how best to improve school life with computing innovations.

# Thanks!

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