

Course Outline:

Coding with Python

This course is designed to offer an overview of computer science. In this self-paced course designed for high school students, academically advanced middle school students will learn programming along with the basics of computer science. The material emphasizes computational thinking and helps develop the ability to solve complex problems.

This course covers the basic building blocks of programming along with other central elements of computer science. It gives a foundation in the tools used in computer science and prepares students for further study in computer science, including AP Computer Science Principles and AP Computer Science A courses.

Prerequisites

No prior computer science knowledge or experience is necessary for this course.

Teaching Strategies

The primary language for the course is Python. The course will consist of video lectures, daily programming exercises, longer coding exercises, regular quizzes, and projects. Students will also participate in online discussion forums.

One major element of the content is the Code-Along videos. In these videos, students are asked to follow along with the instructor as they code. By coding in small chunks and pausing and repeating segments as necessary students are able to work through new topics at their own pace and work towards mastery of the material.

As they master these techniques, students are asked to combine them in longer exercises that let them build a deeper understanding of computer science and programming. Regular quizzes provide them feedback on their progress.

Content Overview

\$149

Module 1: Beginning in Computer Science
Module 2: Number Calculations and Data
Module 3: Making Decisions
Module 4: Repetition and Loops
Module 5: Programming in EarSketch

\$199

Modules 1-5 Plus:

Module 6: Graphics
Module 7: Functions
Module 8: Arrays
Module 9: 2D Arrays
Module 10: Programming in EarSketch
Module 11: Internet
Bonus: Exploring Careers in Computer Science

Modules 1-5 for \$149

Module 1: Beginning in Computer Science

- Lesson 1: What is Computer Science?
- Lesson 2: Using Python
- Lesson 3: First Program
- Lesson 4: Hardware Basics
- Lesson 5: Output
- Lesson 6: Input
- Lesson 7: Data Types and Variables
- Lesson 8: Analog vs. Digital
- Lesson 9: Understanding Binary
- Exercise: Silly Sentences

Module 2: Number Calculations and Data

- Lesson 1: Computer History
- Lesson 2: Basic Calculations
- Lesson 3: Modular Division
- Lesson 4: Built-in Functions
- Lesson 5: Random Numbers
- Lesson 6: Big Data
- Lesson 7: Working with a Real Data Set
- Exercise: Room Area

Module 3: Making Decisions

- Lesson 1: Max and Min
- Lesson 2: Simple Ifs
- Lesson 3: Booleans
- Lesson 4: If – Else
- Lesson 5: Else – If
- Lesson 6: Defining Algorithms
- Lesson 7: Algorithm Challenge
- Exercise: Chatbot

Module 4: Repetition and Loops

- Lesson 1: Loops
- Lesson 2: Count Variables
- Lesson 3: Two Ways to End a Loop
- Lesson 4: Data Revisited
- Lesson 5: Review - Looping
- Lesson 6: Range Function
- Lesson 7: For Loops
- Lesson 8: Counting by Other Than 1
- Lesson 9: Summing
- Lesson 10: Review of Algorithms and Tracing
- Lesson 11: Modeling and Simulation
- Exercise: Evens and Odds

Module 5: Programming in EarSketch

- Lesson 1: Getting Started with EarSketch
- Lesson 2: The Building Blocks of a Program
- Lesson 3: Debugging and Documenting
- Lesson 4: Effects in EarSketch
- Lesson 5: Effects and Envelopes
- Lesson 6: Tempo and Pitch
- Lesson 7: Copyright
- Lesson 8: Evaluating Correctness
- Lesson 9: Musical Form and Custom Functions
- Lesson 10: Recording and Uploading Sounds
- Lesson 11: Making Custom Beats
- Lesson 12: Looping
- Lesson 13: String Operations
- Lesson 14: Musical Repetition
- Exercise: Design a Ringtone in EarSketch

Modules 1-11 + Bonus Content for \$199

Module 6: Graphics

- Lesson 1: Color Code
- Lesson 2: Colors and Loops
- Lesson 3: X & Y Coordinates
- Lesson 4: Lines
- Lesson 5: Draw a House
- Lesson 6: Circles
- Lesson 7: Emoticons
- Lesson 8: Animation
- Exercise: Animation

Module 7: Functions

- Lesson 1: What are Functions?
- Lesson 2: Creating Functions
- Lesson 3: Parameters
- Lesson 4: Returning Values
- Lesson 5: Using Several Functions
- Lesson 6: Tracing Code
- Exercise: Calendar

Module 8: Arrays

- Lesson 1: What are Arrays?
- Lesson 2: Declaring Arrays
- Lesson 3: Element vs Index
- Lesson 4: For Loops and Arrays
- Lesson 5: Array Functions
- Lesson 6: Arrays as Parameters
- Lesson 7: Arrays and Data
- Lesson 8: Sorting and Searching
- Lesson 9: Writing a Simple Search
- Lesson 10: Writing a Simple Sort
- Exercise: Personal Organizer

Module 9: 2D Arrays

- Lesson 1: What is a 2D Array?
- Lesson 2: Declaring 2D Arrays
- Lesson 3: Loops with 2D Arrays
- Lesson 4: Algorithms
- Lesson 5: Algorithms Continued
- Lesson 6: Tracing Code 2D
- Exercise: 2D Arrays

Module 10: Programming in EarSketch

- Lesson 1: Debugging Logic
- Lesson 2: Evaluating Correctness
- Lesson 3: Console Input and Conditionals
- Lesson 4: Data Structures
- Lesson 5: Randomness
- Exercise: Create a Song of the Summer

Module 11: Internet

- Lesson 1: What is the Internet?
- Lesson 2: IP Addressing and DNS
- Lesson 3: Packets and Routers
- Lesson 4: Making Web Pages – HTML Part 1
- Lesson 5: Making Web Pages – HTML Part 2
- Lesson 6: Making Web Pages – HTML Part 3
- Lesson 7: Cybersecurity
- Lesson 8: Net Neutrality
- Exercise: Build Your Own Webpage

Bonus: Exploring Careers in Computer Science

- Lesson 1: Who Uses Computer Science?
- Lesson 2: Data Scientists
- Lesson 3: Computer Science in Medicine
- Lesson 4: Game Developers
- Lesson 5: Computer Science in Entertainment
- Lesson 6: Dance and Music
- Lesson 7: Cybersecurity
- Lesson 8: Social Justice
- Lesson 9: Sports
- Lesson 10: Starting Your Own Business
- Lesson 11: Web Design