

Course Outline:

Introduction to Computer Science

This course is designed to offer an introduction to computer science. Students will learn the basics of computer 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 course was designed to be used in a blended classroom. The primary language for the course is Python. The course will consist of video lectures, daily programming exercises, longer coding assignments, regular quizzes, projects, and exams. 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 and tests give them feedback on their progress.

Unit Overview

Term 1

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

Term 2

Unit 6: Graphics
Unit 7: Functions
Unit 8: Arrays
Unit 9: 2D Arrays
Unit 10: Programming in EarSketch
Unit 11: Internet

Term 1 Units

Unit 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
- Assignment: Silly Sentences

Unit 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
- Assignment: Room Area

Unit 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
- Assignment: Chatbot

Unit 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
- Assignment: Evens and Odds

Unit 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
- Assignment: Design a Ringtone in EarSketch

Term 2 Units

Unit 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
- Assignment: Animation

Unit 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
- Assignment: Calendar

Unit 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
- Assignment: Personal Organizer

Unit 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
- Assignment: 2D Arrays

Unit 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
- Assignment: Create a Song of the Summer

Unit 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
- Assignment: Build Your Own Webpage

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

Term 1 Schedule

Week 01

- Welcome to the Course
- Introduction to EarSketch
- 1.1 What is Computer Science?
- 1.2 Using Python
- 1.3 First Program

Week 02

- 1.4 Hardware Basics
- 1.5 Output
- 1.6 Input
- Unit 1 Quiz

Week 03

- 1.7 Data Types and Variables
- 1.8 Analog vs. Digital
- 1.9 Understanding Binary

Week 04

- Unit 1 Vocabulary & Test Review
- Unit 1 Assignment: Silly Sentences
- Unit 1 Test

Week 05

- 2.1 Computer History
- 2.2 Basic Calculations
- 2.3 Modular Division
- 2.4 Built-in Functions

Week 06

- 2.5 Random Numbers
- Unit 2 Quiz
- 2.6 Big Data
- 2.7 Working with a Real Data Set

Week 07

- Unit 2 Vocabulary & Test Review
- Unit 2 Assignment: Room Area
- Unit 2 Test

Week 08

- 3.1 Max and Min
- 3.2 Simple Ifs
- 3.3 Booleans
- 3.4 If – Else

Week 09

- 3.5 Else – If
- Unit 3 Quiz
- 3.6 Defining Algorithms
- 3.7 Algorithm Challenge

Week 10

- Unit 3 Vocabulary & Test Review
- Unit 3 Assignment: Chatbot
- Unit 3 Test

Week 11

- 4.1 Loops
- 4.2 Count Variables
- 4.3 Two Ways to End a Loop

Week 12

- 4.4 Data Revisited
- 4.5 Review - Looping
- 4.6 Range Functions

Week 13

- 4.7 For Loops
- 4.8 Counting by Other Than 1
- Unit 4 Quiz

Week 14

- 4.9 Summing
- 4.10 Review of Algorithms and Tracing
- 4.11 Modeling and Simulation

Week 15

- Unit 4 Vocabulary & Test Review
- Unit 4 Assignment: Evens and Odds
- Unit 4 Test

Week 16

- 5.1 Getting Started with EarSketch
- 5.2 The Building Blocks of a Program
- 5.3 Debugging and Documenting
- 5.4 Effects in EarSketch
- 5.5 Effects and Envelopes

Week 17

- 5.6 Tempo and Pitch
- 5.7 Copyright
- 5.8 Evaluating Correctness
- 5.9 Musical Form and Custom Functions
- 5.10 Recording and Uploading Sounds
- 5.11 Making Custom Beats
- 5.12 Looping

Week 18

- 5.13 String Operations
- 5.14 Musical Repetition
- Unit 5 Assignment: Design a Ringtone in EarSketch

Term 2 Schedule

Week 01

- 6.1 Color Code
- 6.2 Color Revisited
- 6.3 X & Y Coordinates
- 6.4 Lines
- 6.5 Draw a House
- 6.6 Circle
- Unit 6 Quiz

Week 02

- 6.7 Emoticons
- 6.8 Animation
- Unit 6 Vocabulary & Test Review
- Unit 6 Assignment: Animation
- Unit 6 Test

Week 03

- 7.1 What are Functions?
- 7.2 Creating Functions
- 7.3 Parameters

Week 04

- Unit 7 Quiz
- 7.4 Returning Values
- 7.5 Using Several Functions
- 7.6 Tracing Code

Week 05

- Unit 7 Vocabulary & Test Review
- Unit 7 Assignment: Calendar
- Unit 7 Test

Week 06

- 8.1 What are Arrays?
- 8.2 Declaring Arrays
- 8.3 Element vs Index
- 8.4 For Loops and Arrays
- 8.5 Array Functions

Week 07

- Unit 8 Quiz
- 8.6 Arrays as Parameters
- 8.7 Arrays and Data
- 8.8 Sorting and Searching
- 8.9 Writing a Simple Search

Week 08

- 8.10 Writing a Simple Sort
- Unit 8 Vocabulary & Test Review
- Unit 8 Assignment: Personal Organizer
- Unit 8 Test

Week 09

- 9.1 What is a 2D Array?
- 9.2 Declaring 2D Arrays
- 9.3 Loops with 2D Arrays

Week 10

- Unit 9 Quiz
- 9.4 Algorithms
- 9.5 Algorithms Continued
- 9.6 Tracing Code 2D

Week 11

- Unit 9 Vocabulary & Test Review
- Unit 9 Assignment: 2D Arrays
- Unit 9 Test

Week 12

- 10.1 Debugging Logic
- 10.2 Evaluating Correctness
- 10.3 Console Input and Conditionals
- 10.4 Data Structures
- 10.5 Randomness

Week 13

- Unit 10 Assignment: Create a Song in EarSketch

Week 14

- 11.1 What is the Internet?
- 11.2 IP Addressing and DNS
- 11.3 Packets and Routers

Week 15

- 11.4 Making Web Pages – HTML Part 1
- Unit 11 Quiz
- 11.5 Making Web Pages – HTML Part 2
- 11.6 Making Web Pages – HTML Part 3
- 11.7 Cybersecurity

Week 16

- 11.8 Net Neutrality
- Unit 11 Vocabulary & Test Review
- Unit 11 Assignment: Build Your Own Webpage
- Unit 11 Test

Week 17 - Careers in CS Module

- Lesson 1: Who Uses Computer Science?
- Lesson 2: Data Scientist
- Lesson 3: Computer Science in Medicine
- Lesson 4: Game Developer
- Lesson 5: Computer Science in Entertainment
- Lesson 6: Dance and Music

Week 18 - Careers in CS Module

- Lesson 7: Game Designers
- Lesson 8: Journey to Cryptography
- Lesson 9: Social Justice
- Lesson 10: Sports
- Lesson 11: Starting Your Own Business
- Lesson 12: Web Design
- Course Wrap-Up