

# Course Outline:

## Introduction to Computer Science

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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 they 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: Graphics

#### ***Term 2***

Unit 6: For Loops

Unit 7: Text and String Processing

Unit 8: Functions

Unit 9: Arrays

Unit 10: 2D Arrays

Unit 11: Internet

# Term 1 Units

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## Unit 1: Beginning in Computer Science

- Lesson 1: Welcome
- Lesson 2: What is Computer Science?
- Lesson 3: Using Python – Installing and online IDE
- Lesson 4: First Program
- Lesson 5: Hardware Basics
- Lesson 6: Output
- Lesson 7: Input
- Lesson 8: Data Types and Variables
- Lesson 9: Analog vs. Digital
- Lesson 10: Bits and Pieces – Understanding Binary
- Lesson 11: Career Connection – Who Uses Computer Science?
- Assignment: Silly Sentences
- Supplemental Activities (available in Teacher Packet only):
  - More ASCII Art
  - More Input Practice Problems
  - What Is a Computer – Project

## 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: Color Code
- Lesson 7: Big Data
- Lesson 8: Working with a Real Data Set
- Lesson 9: Career Connection – Data Scientists
- Assignment: Room Area
- Supplemental Activities (available in Teacher Packet only):
  - Modular Division Practice Problems
  - Practice Calculations

## Unit 3: Making Decisions

- Lesson 1: Max and Min
- Lesson 2: Simple If's
- Lesson 3: Booleans
- Lesson 4: If – Else
- Lesson 5: Else – If
- Lesson 6: Defining Algorithms
- Lesson 7: Algorithm Challenge
- Lesson 8: History – Turing Machines
- Lesson 9: Career Connection – Computer Science in Medicine
- Assignment: Chatbot
- Supplemental Activities (available in Teacher Packet only):
  - Basic If-Then Statement Practice Exercises

## 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: Connection – Games with a Purpose (GWAP)
- Lesson 6: Making a Game
- Lesson 7: Internet - Cybersecurity
- Lesson 8: Career Connection - Game Developers
- Assignment: Student Schedule
- Supplemental Activities (available in Teacher Packet only):
  - Practice Loops Worksheet

## Unit 5: Graphics

- Lesson 1: Color Revisited
- Lesson 2: X & Y coordinates
- Lesson 3: Lines
- Lesson 4: Draw a House
- Lesson 5: Circles
- Lesson 6: Emoticons
- Lesson 7: Kaleidoscope
- Lesson 8: Animation
- Lesson 9: History of Movies
- Lesson 10: Career Connection – Computer Science in Entertainment
- Assignment: Animation
- Supplemental Activities (available in Teacher Packet only):
  - Practice Line Drawings

## Term 2 Units

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### Unit 6: For Loops

- Lesson 1: Review – Looping
- Lesson 2: Range Function
- Lesson 3: For Loops
- Lesson 4: Counting By Other Than 1
- Lesson 5: Summing
- Lesson 6: Review Algorithms and Tracing
- Lesson 7: Modeling and Simulation
- Lesson 8: Introduction to EarSketch
- Lesson 9: Career Connection – Dance and Music
- Assignment: Shapes
- Supplemental Activities (available in Teacher Packet only):
  - Practice Loops Worksheet

### Unit 7: Text and String Processing

- Lesson 1: ASCII and Character Functions
- Lesson 2: Processing Strings
- Lesson 3: Text Files – Input
- Lesson 4: Text Files – Output
- Lesson 5: Processing Strings in Files
- Lesson 6: External Resource: Text Compression
- Lesson 7: Journey to Cryptography
- Lesson 8: Career Connection – Cybersecurity
- Assignment: Random Joke Generator

### Unit 8: Functions

- Lesson 1: What are Functions?
- Lesson 2: Creating Functions
- Lesson 3: Parameters
- Lesson 4: Chris Bosh on Functions
- Lesson 5: Functions – Returning values
- Lesson 6: Example – Using Several Functions
- Lesson 7: Tracing Code
- Lesson 8: Functions in EarSketch
- Lesson 9: Career Connection – Social Justice
- Assignment: Calendar
- Supplemental Activities (available in Teacher Packet only):
  - Subprograms Worksheet

## Unit 9: 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
- Lesson 11: Career Connection – Sports
- Assignment: Personal Organizer

## Unit 10: 2D Arrays

- Lesson 1: What is a 2D Array?
- Lesson 2: Declaring 2D Arrays
- Lesson 3: Loops with 2D Arrays
- Lesson 4: Algorithms – Part 1
- Lesson 5: Algorithms – Part 2
- Lesson 6: Tracing Code 2D
- Lesson 7: Career Connection – Starting Your Own Business
- Assignment: 2D Arrays

## 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
- Lesson 9: Career Connection – Web Design
- Assignment: Build Your Own Webpage

# Term 1 Schedule

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## Week 01

- 1.1 Welcome
- 1.2 What is Computer Science?
- 1.3 Using Python
- 1.4 First Program

## Week 02

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

## Week 03

- 1.8 Data Types and Variables
- 1.9 Analog vs. Digital
- 1.10 Bits and Pieces – Understanding Binary

## Week 04

- 1.11 Career Connection – Who Uses Computer Science?
- Unit 1 Vocabulary & Test Review
- Unit 1 Lab 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 Color Code
- 2.7 Big Data
- 2.8 Working with a Real Data Set

## Week 07

- 2.9 Career Connection – Data Scientists
- Unit 2 Vocabulary & Test Review
- Unit 2 Lab Assignment – Room Area
- Unit 2 Test

## Week 08

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

## Week 09

- 3.5 Else – If
- Unit 3 Quiz
- 3.6 Defining Algorithms
- 3.7 Algorithm Challenge
- 3.8 History – Turing Machines

## Week 10

- 3.9 Career Connection – Computer Science in Medicine
- Unit 3 Vocabulary & Test Review
- Unit 3 Lab 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 Connection – Games with a Purpose (GWAP)
- 4.6 Making a Game
- Unit 4 Quiz

## **Week 13**

- 4.7 Internet – Cybersecurity
- 4.8 Career Connection – Game Developers
- Unit 4 Vocabulary & Test Review
- Unit 4 Lab Assignment – Student Schedule
- Unit 4 Test

## **Week 14**

- 5.1 Color Revisited
- 5.2 X & Y coordinates
- 5.3 Lines
- 5.4 Draw a House

## **Week 15**

- 5.5 Circles
- Unit 5 Quiz
- 5.6 Emoticons
- 5.7 Kaleidoscope

## **Weeks 16-18**

- 5.8 Animation
- 5.9 History of Movies
- 5.10 Career Connection – Computer Science in Entertainment
- Unit 5 Vocabulary & Test Review
- Unit 5 Lab Assignment – Animation
- Unit 5 Test



# Term 2 Schedule

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## Week 01

- 6.1 Review – Looping
- 6.2 Range Function
- 6.3 For Loops
- 6.4 Counting by Other Than 1

## Week 02

- Unit 6 Quiz
- 6.5 Summing
- 6.6 Review Algorithms and Tracing
- 6.7 Modeling and Simulation

## Week 03

- 6.8 Introduction to EarSketch
- 6.9 Career Connection – Dance and Music
- Unit 6 Vocabulary & Test Review
- Unit 6 Lab Assignment – Shapes
- Unit 6 Test

## Week 04

- 7.1 ASCII and Character Functions
- 7.2 Processing Strings
- 7.3 Text Files – Input

## Week 05

- 7.4 Text Files – Output
- Unit 7 Quiz
- 7.5 Processing Strings in Files
- 7.6 External Resource: Text Compression

## Week 06

- 7.7 Journey to Cryptography
- 7.8 Career Connection – Cybersecurity
- Unit 7 Vocabulary & Test Review
- Unit 7 Lab Assignment – Random Joke Generator
- Unit 7 Test

## Week 07

- 8.1 What are Functions?
- 8.2 Creating Functions
- 8.3 Parameters
- 8.4 Chris Bosh on Functions

## Week 08

- Unit 8 Quiz
- 8.5 Functions – Returning Values
- 8.6 Example – Using Several Functions
- 8.7 Tracing Code

## Week 09

- 8.8 Functions in EarSketch
- 8.9 Career Connections – Social Justice
- Unit 8 Vocabulary & Test Review
- Unit 8 Lab Assignment – Calendar
- Unit 8 Test

## Week 10

- 9.1 What are Arrays?
- 9.2 Declaring Arrays
- 9.3 Element vs Index
- 9.4 For Loops and Arrays
- 9.5 Array Functions

## Week 11

- Unit 9 Quiz
- 9.6 Arrays as Parameters
- 9.7 Arrays and Data
- 9.8 Sorting and Searching
- 9.9 Writing a Simple Search

## Week 12

- 9.10 Writing a Simple Sort
- 9.11 Career Connection – Sports
- Unit 9 Vocabulary & Test Review
- Unit 9 Lab Assignment – Personal Organizer
- Unit 9 Test

## Week 13

- 10.1 What is a 2D Array?
- 10.2 Declaring 2D Arrays
- 10.3 Loops with 2D Arrays

## Week 14

- Unit 10 Quiz
- 10.4 Algorithms – Part 1
- 10.5 Algorithms – Part 2
- 10.6 Tracing Code 2D

## Week 15

- 10.7 Career Connection – Starting Your Own Business
- Unit 10 Vocabulary & Test Review
- Unit 10 Lab Assignment – 2D Arrays
- Unit 10 Test

## Week 16

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

## Week 17

- 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 18

- 11.8 Net Neutrality
- 11.9 Career Connection – Web Design
- Unit 11 Vocabulary & Test Review
- Unit 11 Lab Assignment – Build Your Own Webpage
- Unit 11 Test