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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 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

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

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

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Term 1 Schedule

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

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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

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Term 2 Schedule

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