CodeHS

Utah Computer Programming 2 Course Syllabus

One Semester for High School, 60 Hours

Course Overview and Goals

Utah Computer Programming 2 introduces students to more advanced programming concepts. Students will learn to create more powerful programs using functions, strings, data structures, file i/o operations, and objects. Once students complete this course, they will have learned material equivalent to the second half of a semester college introductory course in computer science and be able to program Python 3 programs.

Learning Environment: The course utilizes a blended classroom approach. The content is fully web-based, with students writing and running code in the browser. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students. Each unit of the course is broken down into lessons. Lessons consist of video tutorials, short quizzes, example programs to explore, and written programming exercises, adding up to over 60 hours of hands-on programming practice in total. Each unit ends with a comprehensive unit test that assesses students' mastery of the material from that unit where students can display their understanding of the material.

Programming Environment: Students write and run Python programs in the browser using the CodeHS editor.

More information: Browse the content of this course at https://codehs.com/course/20395/overview

Prerequisites: Utah Computer Programming 1 is a prerequisite for this course.

Course Breakdown

Unit 1: Functions and Exceptions(1-2 week/5-8 hours)

Students learn how to decompose problems into smaller pieces that work together to solve a problem.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/28186

Objectives / Topics Covered	● Functions ● Namespaces ● Parameters ● Return Values ● Exceptions
Example Assignments / Labs	● Example exercises: ○ Functions ■ Raining cats and dogs - Write functions to print text art of a cat and a dog ■ Temperature converter - write functions to convert from Fahrenheit to Celsius and vice versa ○ Exceptions ■ Temperature converter, part 2 - Add exception handling to your temperature conversion program ○ Putting it all together ■ Enter a positive number - Make a function to repeatedly ask the user to enter a number until they enter a positive number

Unit 2: Strings (1-2 weeks/5-8 hours)

Students learn more sophisticated strategies for manipulating text in their programs.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/28187

Objectives / Topics Covered	● Indexing and Slicing ● Math Operators on Strings ● For Loops Over a String ● String Methods
Example Assignments / Labs	● Example exercises: ○ Indexing ■ First character - write a function that takes a string and returns the first character ■ All but the first character - write a function that takes a string and returns everything but the first character ○ Math operators and strings ■ Full name - write a function that takes two strings (a first name and a last name) and returns a full name as a single string ■ Replace a letter - write a function that takes a string and returns a copy with the character at a particular index replaced with a dash ○ For loops on strings ■ Count occurrences - write a function that takes two strings and returns the number of times the second string appears in the first string ○ String methods ■ Add enthusiasm - write a function that takes a string and returns that string in all upper case ■ Remove all from string - write a function that takes two strings and returns a string that consists of the first string with all instances of the second string removed

Unit 3: Project: Game of Pig (1 week/ 4 hours)

Students program a classic two-player game played with a six-sided die.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/29242

Objectives / Topics Covered	● Allow students to combine a variety of topics in a single program ● Introduce students to incremental development ● Strengthen debugging skills by having students develop a larger project ● Team project development skills

Unit 4: Creating and Altering Data Structures (1-2 weeks/5-8 hours)
Students learn how tuples and lists are formed and the various methods that can alter them.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/28188

Objectives / Topics Covered	● Tuples ● Lists ● For Loops and Lists ● List Methods
Example Assignments / Labs	● Example exercises: ○ Tuples ■ Cookout Orders - Given a tuple of food orders, add up the number of burgers and hotdogs and print the total sums. ○ Lists ■ Listed Greeting - Ask a user to enter their name, age, and favorite sport, then split their response into list elements and use index values to greet them by name and respond that you enjoy that sport as well! ■ Exclamat!on Po!nts - Ask the user for a string and then print the same string with every lowercase i replaced with an exclamation point. ■ Librarian - Ask the user for the last names of the authors of the five books they are returning. Print a list of those names in sorted order.

Unit 5: Extending Data Structures (1-2 weeks/5-8 hours)
Students learn to build more complex programs that make use of grids and dictionaries.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/29170

Objectives / Topics Covered	● Dictionaries ● 2d lists ● List comprehensions ● Packing and unpacking ● Mutable vs. immutable
Example Assignments / Labs	● Example exercises: ○ Dictionaries ■ Phone book - user repeatedly enters their name, and the program either asks for the person’s phone number or reports the phone number already provided ○ 2d lists ■ Checkerboard - write a program that prints the initial setup of a checkerboard, with a 1 where a piece would be and a 0 where a blank square would be

Unit 6: Project: Guess the Word (1 week/ 4 hours)

Students write a program for a word guessing game.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/29171

Objectives / Topics Covered	● Allow students to combine a variety of topics (strings, loops, booleans, user input, etc.) in a single program ● Introduce students to incremental development ● Strengthen debugging skills by having students develop a larger project ● Testing

Unit 7: File I/O (1-2 week/5-8 hours)

Students learn to read, write, and process information from text files.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/29130

Objectives / Topics Covered	● Reading from Files ● Writing to Files ● Processing File Data
Example Assignments / Labs	● Example exercises: ○ Reading from Files ■ Validating Tweet Length - Write a function called that reads the contents of a text file tweet.txt and determines whether the text represents a valid tweet. ○ Write to Files ■ Activity Tracker - Imagine you are building an activity tracker program. Your task is to write a program that logs a list of activities to a file.

Unit 8: Classes and Objects (1-2 week/5-8 hours)

Students learn the principles of object-oriented design.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/28192

Objectives / Topics Covered	● Classes and Objects ● Methods ● Operator Overloading ● Class Variables ● Instance Variables
Example Assignments / Labs	● Example exercises: ○ Methods ■ The Rectangle Class, Part 3 - Change your Rectangle class so that it has a method that returns the area of the rectangle. ○ Class Variables ■ The Rectangle Class, Part 9 - Add a class variable that will increase every time a new rectangle is created.

Unit 9: Exploring CS Careers (3 days/2-4 hours)

Students learn potential career paths in the field of computer science.

Browse the full content of this unit at https://codehs.com/course/20395/explore/module/29283

Objectives / Topics Covered	● Computer Science Careers ● Career Exploration
Example Assignments / Labs	● Example exercises: ○ Career Exploration ■ Career Exploration Presentation - For this project, you will create a presentation on a career of your choosing. Your presentation should include images, bulleted points, and information from cited resources, including online articles, books, videos, and more.