CodeHS

Intro to Python with Tracy the Turtle Syllabus
1 quarter for Middle or High School (30 contact hours)

Course Overview and Goals

The CodeHS Introduction to Python with Tracy the Turtle course teaches students the basics of programming in the Python language. Tracy is a turtle that can be instructed with the use of various commands to draw scenes on a canvas. Students will learn Python commands, functions, and control structures by solving puzzles and writing creative programs for Tracy to follow.

Learning Environment: The course utilizes a blended classroom approach. The content is a mix of web-based and physical activities. Students will write and run code in the browser and engage in in-person collaborative exercises with classmates. Teachers utilize tools and resources provided by CodeHS to leverage time in the classroom and give focused 1-on-1 attention to students.

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

Quizzes: Each lesson includes at least one formative short multiple choice quiz.

Prerequisites: The Introduction to Python with Tracy the Turtle course is designed for complete beginners with no previous background in computer science or as a secondary introductory course that explores a new language, after our Introduction to Computer Science in JavaScript course. The course is highly visual, dynamic, and interactive, making it engaging for those new to computer science.

More information: Browse the content of this course at https://codehs.com/course/4085

Course Breakdown

Unit 1: Tracy's World (.5 week/2 hours)
Browse the full content of this unit at https://codehs.com/library/course/4085/module/5569

Objectives / Topics Covered	- What is a command? - How do we communicate with computers? - Moving Tracy - Drawing circles - Tracy's coordinate system
Example Assignments / Labs	3 exercises total - Commands - Drawing simple graphics - Example Exercise: Caterpillar Combine multiple commands to write a program that has Tracy draw 5 circles in a row

Unit 2: Moving Tracy Efficiently (1 week/4 hours)

Browse the full content of this unit at https://codehs.com/library/course/4085/module/5569

Objectives / Topics Covered	● Turning Tracy at right angles ● For Loops ● Using coordinates and angles to move Tracy's position
Example Assignments / Labs	● 7 exercises total ● Turning Tracy at right angles 　○ Learn how to use the left and right commands to let Tracy explore more of her world 　○ Example Exercise: 4 Columns 　Write a program that will have Tracy split her world into 4 columns by drawing 3 vertical lines 100 pixels apart ● For Loops 　○ For loops execute the code inside the loop a set number of times. 　○ Example Exercise: Row of Circles 　In this program, Tracy should draw a row of circles across the width of the canvas using a for loop. ● Using coordinates and angles to move Tracy's position 　○ Any angle can be used to have Tracy draw shapes with diagonal lines. 　○ Example Exercise: Hexagon 　Write a program, using for loops, that has Tracy draw a hexagon on the canvas. 　○ Tracy can be moved directly to a position on the canvas using coordinate points. 　○ Example Exercise: Circle Pyramid 　Write a program that directs Tracy to draw a pyramid with 3 circles on the bottom row, 2 in the middle, and 1 on top.

Unit 3: Designing and Communicating Solutions (1 week/6 hours)

Browse the full content of this unit at https://codehs.com/library/course/4085/module/5571

Objectives / Topics Covered	● Commenting your code ● Naming rules in Python ● Functions ● Artistic commands ● Top Down Design
Example Assignments / Labs	● 8 exercises total ● Commenting Your Code 　○ Commenting is important to make sure your code is understandable to yourself and others. 　　■ Example Exercise: Circle Pyramid with Comments 　　Take your Circle Pyramid program from earlier and add comments to explain what your program is doing. ● Functions 　○ Teach Tracy new commands by grouping a set of commands that can be called with one line of code. 　○ Example Exercise: Shape Stack 　Give Tracy instructions to draw a tower of squares and circles from the bottom to the top of the canvas.

- Artistic Commands
  - There are many ways to get creative with the graphics Tracy draws, such as using color, filling in shapes, and leaving trails with varying thicknesses.
  - Example Exercise: Kid's Shapes Toy
    Write a program to have Tracy draw a representation of a popular toy used to teach children shapes and colors. There should be 4 different shapes with 4 different colors.
- Top Down Design
  - Solve large Tracy problems by breaking them down into smaller, more manageable problems.
  - Example Exercise: Bubble Wrap 2.0
    In this program, you should have Tracy add highlights to each bubble from our Bubble Wrap example program. Use top down design to break this large problem into smaller pieces!

Unit 4: Controlling Tracy with Variables (1.5 week/7 hours)

Browse the full content of this unit at https://codehs.com/library/course/4085/module/5572

Objectives / Topics Covered	- Variables - User input - Parameters - The value of i in for loops
Example Assignments / Labs	10 exercises total - Variables - Variables are used to store and manipulate values in our programs. - Example Exercise: Dart Board Write a program that uses variables to draw a dart board which consists of 4 concentric circles that each increase in radius by 25 pixels. - User Input - We can use input from a user to control certain commands in our code and make our programs more personalized. - Example Exercise: Four Corners User input will dictate the length of the sides of a square. Squares of the indicated size will be drawn in each corner of the canvas. - Parameters - Parameters can be used to customize functions to make them more reusable. - Example Exercise: Colorful Caterpillar Use parameters to draw a caterpillar with 8 body circles of 4 different colors. - The Value of i in For Loops - The value of i in a for loop is actually a variable! It can be altered and used to control commands in our code. - Example Exercise: Dart Board Using i Alter your previous Dart Board program to use the value of i to control the circle's radius instead of a separate variable.

Unit 5: Making Decisions (1 week/5 hours)

Browse the full content of this unit at https://codehs.com/library/course/4085/module/5573

Objectives / Topics Covered	- If statements - If/else statements - While loops
Example Assignments / Labs	6 exercises total - If statements - If statements will execute code only if certain conditions are met - Example Exercise: Happy Face Write a program that will draw a happy face on the screen if the user answers that they are happy. - If/Else statements - The if/else statement executes a block of code if a specified condition is true. If the condition is false, another block of code can be executed. - Example Exercise: Rating Write a program that shows a graphical representation of a user's rating value. If the value is between 1 and 4, draw a red X. If it is between 5 and 7, draw a yellow horizontal line. If it is an 8 or above, draw a green checkmark. - While Loops - A while loop allows code to be executed repeatedly based on a given Boolean condition. - Example Exercise: Increasing Squares Write a program that has Tracy draw concentric squares form the center of the canvas until the length variable reaches 400 pixels.

Unit 6: Tracy Challenges (1 week/6 hours)

Browse the full content of this unit at https://codehs.com/library/course/4085/module/5574

Objectives / Topics Covered	- Control Structures - Commands - Defining versus Calling Functions - Control flow - Looping - Conditionals - Commenting code - Top Down Design
Example Assignments / Labs	- Challenges - Students use all of the skills learned in the course to solve complex puzzles and challenges. - Example Exercise: Guess a Number 2.0 Write a program that allows the user to guess a secret number. If their number is too high, draw a down arrow. If their number is too low, draw an up arrow. If they guess the number, draw a checkmark and end the program.

Supplemental Material

Supplementary Units	Prerequisite/Recommended Unit(s)	# of activities
Advanced Tracy Challenges	All modules in course are complete	4
Abstraction	Preferably placed following 'Top Down Design' in the 'Designing and Communicating Solutions' module.	6
Categorizing Triangles	All modules in course are complete; students should have some basic knowledge of geometry	13