

| Unit                                                                    | Topic | Lesson | Lesson Objectives |
|-------------------------------------------------------------------------|-------|--------|-------------------|
| <b>Computer Science I</b>                                               |       |        |                   |
| <b>Course Overview</b>                                                  |       |        |                   |
| <b>Introduction</b>                                                     |       |        |                   |
| Describe the goal of the course                                         |       |        |                   |
| Describe some careers found in this field                               |       |        |                   |
| List some of the projects that you will complete in the course          |       |        |                   |
| List tips for achieving academic success in the course                  |       |        |                   |
| <b>Start the Course</b>                                                 |       |        |                   |
| Identify computer requirements                                          |       |        |                   |
| Learn how to move through the course                                    |       |        |                   |
| Switch between windows                                                  |       |        |                   |
| <b>Set Up Your Computer</b>                                             |       |        |                   |
| Find files and folders on a computer                                    |       |        |                   |
| Set up a computer to show the List folder view and file name extensions |       |        |                   |
| Make a course folder                                                    |       |        |                   |
| <b>Set Up a Browser and Install Software</b>                            |       |        |                   |
| Set up a web browser                                                    |       |        |                   |
| Download and install a zip utility                                      |       |        |                   |
| Zip and unzip files and folders                                         |       |        |                   |
| Download and unzip course resources                                     |       |        |                   |
| Install software                                                        |       |        |                   |
| <b>Research and Citation</b>                                            |       |        |                   |
| Identify sources of trustworthy information                             |       |        |                   |
| Define plagiarism and citation                                          |       |        |                   |
| <b>Starting With Python</b>                                             |       |        |                   |
| <b>Draw a Line</b>                                                      |       |        |                   |
| Learn about programming and Python                                      |       |        |                   |
| Use the Python (command line) window                                    |       |        |                   |
| Use the Python turtle program to draw a line                            |       |        |                   |

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|                              |       | <b>Draw Shapes</b>                 | <ul style="list-style-type: none"> <li>Draw a square using the forward() and right() commands</li> <li>Draw a circle using the circle() command</li> <li>Draw a square and a triangle using the circle() command</li> <li>Change the color of the turtle's lines</li> </ul>                                                                                                                     |
|                              |       | <b>Write a Program</b>             | <ul style="list-style-type: none"> <li>Use the IDLE Python Shell and text editor</li> <li>Write a program to draw two squares, a circle, and a triangle</li> <li>Use the exitonclick() command</li> <li>Save and run a program</li> </ul>                                                                                                                                                       |
| <b>Graphical Hello World</b> |       |                                    |                                                                                                                                                                                                                                                                                                                                                                                                 |
|                              |       | <b>Draw an H</b>                   | <ul style="list-style-type: none"> <li>Compare code written in different programming languages</li> <li>Identify the X and Y coordinates of points on a grid</li> <li>Use coordinates and the goto() command to move the turtle to a specific location</li> <li>Use the penup() and pendown() commands to stop and start drawing</li> <li>Move the turtle to draw a capital letter H</li> </ul> |
|                              |       | <b>Comments and Spaces</b>         | <ul style="list-style-type: none"> <li>Identify the purpose of comments</li> <li>Write code to draw spaces between letters</li> <li>Write code to draw the letters E, L, and O</li> <li>Add comments to the code to help explain it</li> </ul>                                                                                                                                                  |
|                              |       | <b>Define a Function</b>           | <ul style="list-style-type: none"> <li>Identify the purpose of functions and arguments</li> <li>Use whitespace to correctly format function definitions</li> <li>Save the hello.py program as a new file</li> <li>Define the code that moves the turtle to its start location as a function</li> </ul>                                                                                          |
|                              |       | <b>Define the Letter Functions</b> | <ul style="list-style-type: none"> <li>Define the different parts of the letter drawing program as functions</li> <li>Call the draw_space() function inside the letter drawing functions</li> <li>Organize function definitions and function calls in the correct order</li> </ul>                                                                                                              |

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|      | <b>Variables</b> |                                 |                                                                                                                                                                                                                                                                                                                     |
|      |                  | <b>Values and Variables</b>     | <ul style="list-style-type: none"> <li>Define values and identify types of values</li> <li>Use strings, integers, floating point numbers, and operators</li> <li>Define variables and identify the purpose of variables</li> <li>Identify rules for naming variables</li> <li>Assign values to variables</li> </ul> |
|      |                  | <b>Changing Variable Values</b> | <ul style="list-style-type: none"> <li>Change the value that is assigned to a variable</li> <li>Create values that contain operators</li> <li>Use concatenation to combine strings</li> </ul>                                                                                                                       |
|      |                  | <b>Functions and Variables</b>  | <ul style="list-style-type: none"> <li>Identify reasons for using variables instead of values</li> <li>Declare variables for use in the hello_by_variables program</li> <li>Use variables with functions</li> <li>Modify variable values with operators</li> </ul>                                                  |
|      |                  | <b>Finish Adding Variables</b>  | <ul style="list-style-type: none"> <li>Declare more variables for use in the hello_by_variables program</li> <li>Use variables with functions</li> <li>Modify variable values with operators</li> <li>Use the input() function to prompt the user for a pen color and width</li> </ul>                              |
|      | <b>Loops</b>     |                                 |                                                                                                                                                                                                                                                                                                                     |
|      |                  | <b>The for Loop</b>             | <ul style="list-style-type: none"> <li>Use the print() function</li> <li>Learn about looping, the for loop, and iterator variables</li> <li>Use for loops with the range() function</li> <li>Slow down the turtle</li> </ul>                                                                                        |
|      |                  | <b>Continue Looping</b>         | <ul style="list-style-type: none"> <li>Comment out code</li> <li>Change the angle of the turtle's turns to draw different shapes</li> <li>Define object, class, and instance</li> <li>Create multiple turtles and draw with them at the same time</li> </ul>                                                        |

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### Loops and Bugs

- Write a HELLO() function definition made up of the draw letter functions
- Put the HELLO() function in a for loop in order to draw the word several times
- Use the iterator variable to change the look of the letters each time HELLO is drawn
- Learn about types of bugs and debugging techniques

## A Drawing Program

### IDLE Preparation

- Use IDLE's interactive help system and the help() function
- Learn about interactivity and GUIs
- Learn about file managers and file paths
- Check the Windows shortcut or Mac OS X app for running IDLE in an alternate mode

### Click the Turtle

- Open IDLE in an alternate mode
- Learn about events, event handlers, click events, and callback functions
- Use the onclick() function to make something happen when a turtle is clicked
- Create three new instances of the turtle to use as buttons
- Set up a button to make the unnamed turtle draw a red circle

### Finish the onclick Program

- Finish setting up the turtle buttons
- Write code to make a turtle draggable
- Add code to clear the screen with a SPACEBAR keypress
- Identify the purpose of docstrings and how to view them for a module
- Add a docstring to the program to describe what it does

## Software Development

### A Simple Model of Software Development

- Identify the stages in the simple model of software development
- Define model, UCD, requirement, and constraint
- Identify differences between requirements and constraints
- Define software design document, scope of work, and client
- Identify phases of software development, including pre-alpha, alpha, feature complete, beta, and code complete

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|      |       |        | <p><b>Exploring Software Development</b></p> <ul style="list-style-type: none"> <li>Define formal and informal development method</li> <li>Identify the stages in the waterfall model of software design</li> <li>Describe how iterative and incremental models of software development work</li> <li>Identify the stages of the spiral model</li> <li>Define open source software, closed source software, proprietary software, forking, deadline, and external factors</li> </ul> <p><b>Developing Solutions</b></p> <ul style="list-style-type: none"> <li>Define client, stakeholder, and end user</li> <li>Define Software Requirements Specification</li> <li>Identify types of client requirements</li> <li>Define dependency</li> </ul> <p><b>Planning</b></p> <ul style="list-style-type: none"> <li>Define functional specification and use case</li> <li>Define software architect and identify software architecture topics</li> <li>Define programming paradigm and structure</li> <li>Identify common programming paradigms</li> <li>Define flowchart and shelfware</li> </ul> <p><b>Writing and Testing</b></p> <ul style="list-style-type: none"> <li>Define code style and identify the purpose of coding principles and style guides</li> <li>Read The Zen of Python</li> <li>Visit the Python style guide</li> <li>Identify common methods for organizing the code writing</li> <li>Define Quality Assurance, usability testing, test case, and automated testing</li> </ul> |
|      |       |        | <p><b>Strings and Lists</b></p> <p><b>Escape Characters</b></p> <ul style="list-style-type: none"> <li>Define expression, return, literal character, and special character</li> <li>Define escape character and escaping a character</li> <li>Identify commonly used escape sequences</li> <li>Use raw strings</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|      |       |        | <p><b>Manipulating Strings With Methods</b></p> <ul style="list-style-type: none"> <li>Define literals, manipulation, and mutability</li> <li>Identify the two main ways of manipulating strings, including methods and operations</li> <li>Identify and use common string methods</li> </ul> <p><b>Slicing and Striding</b></p> <ul style="list-style-type: none"> <li>Describe how slicing and striding work</li> <li>Slice substrings from strings</li> <li>Stride through characters in a string</li> <li>Reverse the characters in a string</li> </ul> <p><b>Concatenate and Compare Strings</b></p> <ul style="list-style-type: none"> <li>Concatenate strings with the + and * operators</li> <li>Compare values of strings</li> <li>Define Boolean data type and Unicode</li> <li>Combine string manipulation techniques</li> </ul> <p><b>Lists</b></p> <ul style="list-style-type: none"> <li>Define list and list element</li> <li>Identify and use common list methods</li> <li>Identify and use common list operations</li> <li>Add and remove elements from lists</li> <li>Split strings into lists and join lists into strings</li> </ul> <p><b>Manipulate a Text File</b></p> <ul style="list-style-type: none"> <li>Count words in a string and print the result</li> <li>Count sentences in a string and print the result</li> <li>Take a substring input by the user and count the number of times it appears in a string</li> <li>Split a string into a list and remove the newline escape sequence</li> <li>Count the number of elements in the list, sort the list alphabetically, and use a loop to print the first 10 elements in the list</li> </ul> |