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| **Unit 2.2** | **2.2 Programming Fundamentals Road Map** |
| In this unit you will investigate water on the land. The aims are as follows:**LG1**: Knowledge**LG2**: Application**LG3**: Skills | Assessment Grades |  |  |
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| **Themes** | **Learning Goals/Outcomes/Content** |  |  |  |
| Computational thinkingDecompositionAbstractionAlgorithmic thinkingCommon errorsInputOutputArithmeticString handlingCastingTestDebug | **LG1:** Identify and correct common errors in computer programs.**LG2**: Be able to use inputs, outputs, arithmetic and string handling.**LG2:** Apply knowledge of computational thinking to solve complex problems. |  |  |  |
| SequenceSelectionIterationIf, elif, else | **LG1:** Understand what the three basic programming constructs are.**LG2:** Describe the different comparison operators.**LG2 & LG3:** Be able to use selection statements. |  |  |  |
| For loopWhile loop | **LG1:** Understand the difference between a for and while loop.**LG2 & LG3:** Be able to use counter controlled (for) loops.**LG2 & LG3:** Be able to use condition controlled (while) loops |  |  |  |
| SubroutinesFunctions | **LG1:** Understand how to use subroutines (called procedures or functions) to help make your programs easier to create and more efficient.**LG2 & LG3:** Apply knowledge of subroutines to plan and write a program that contains a subroutine. |  |  |  |
| String manipulationValidationRegular expression | **LG1:** To understand the use and results of various built in string manipulation methods.**LG1:** Understand the purpose of validation.**LG1:** Understand the purpose of a regular expression.**LG2 & LG3:** Be able to use a regular expression to validate an input. |  |  |  |
| ArrayListAppend | **LG1:** Understand why lists and arrays are useful.**LG2:** Be able to read and edit data in a list.**LG1:** Know how to declare and append to a list**LG2 & LG3:** Apply knowledge of arrays/lists to plan and write a program that contains an array/lists. |  |  |  |
| ArrayListSort | **LG1:** Understand why you might want to sort a list.**LG1:** Know how to sort a list using Python.**LG2:** Be able to use other functions with lists.**LG2 & LG3:** Apply knowledge of arrays/lists to plan and write a program that contains an array/lists. |  |  |  |
| Read data from a fileInterrogate data | **LG1:** Understand how to read data from a file.**LG1:** Know how to interrogate data.**LG2 & LG3:** Apply knowledge of reading data from files to plan and write a program. |  |  |  |
| Write data to a fileAppend | **LG1:** Understand what “append” means.**LG1:** Know how to append data to a file.**LG2 & LG3:** Apply knowledge of reading data from files to plan and write a program. |  |  |  |
| 2D List/ Array | **LG1:** Understand the nature of a 2D list.**LG2:** Be able to use a 2D list to solve a problem.**LG2 & LG3:** Apply knowledge of 2D arrays/ lists to plan and write a program. |  |  |  |
| FlagSolve problems | **LG1:** Understand what a ‘flag’ is in a computer program.**LG1:** Know how to use a while loop to validate data entry**LG2 & LG3:** Use programming ’set pieces’ for common problems |  |  |  |
| RecordFieldQueryCommands | **LG1:** Know the use of records to store data**LG1:** Understand the use of SQL to search for data.**LG2 & LG3:** Apply knowledge of SQL to plan and write a query in SQL |  |  |  |
| Practical Programming Project |  |  |  |  |

**Links:**

**LG1:** Algorithms are used to support 2.2 programming fundamentals, 2.3 producing robust programs and any scenario where you are required to write a list of instructions.

**LG2:** Application of your understanding of an algorithm is important so that you can write an algorithm to design a computer program.

**LG3:** Being able to write an algorithm is important to design a computer program.