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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 thinking  Decomposition  Abstraction  Algorithmic thinking  Common errors  Input  Output  Arithmetic  String handling  Casting  Test  Debug | **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. | | |  |  |  |
| Sequence  Selection  Iteration  If, 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 loop  While 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 | | |  |  |  |
| Subroutines  Functions | **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 manipulation  Validation  Regular 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. | | |  |  |  |
| Array  List  Append | **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. | | |  |  |  |
| Array  List  Sort | **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 file  Interrogate 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 file  Append | **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. | | |  |  |  |
| Flag  Solve 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 | | |  |  |  |
| Record  Field  Query  Commands | **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.