**Python Programming**

**Section 1 Essential concepts and skills**

**Chapter 1 An introduction to Python programming**

* Introduction to Python
* Why Python works so well as your first programming language
* Three types of Python applications
* The source code for a console application
* How Python compiles and runs source code
* How disk storage and main memory work together

**How to use IDLE to develop programs**

* How to use the interactive shell
* How to work with source files
* How to compile and run a program
* How to fix syntax and runtime errors

**Chapter 2 How to write your first programs**

**Basic coding skills**

* How to code statements
* How to code comments
* How to use functions

**How to work with data types and variables**

* How to assign values to variables
* How to name variables

**How to work with numeric data**

* How to code arithmetic expressions
* How to use arithmetic expressions in assignment statements
* How to use the interactive shell for testing numeric operations

**How to work with string data**

* How to assign strings to variables
* How to join strings
* How to include special characters in strings
* How to use the interactive shell for testing string operations

**How to use five of the Python functions**

* How to use the print() function
* How to use the input() function
* How to use the int(), float(), and round() functions
* How to chain functions

**Two illustrative programs**

* The Miles Per Gallon program
* The Test Scores program

**Chapter 3 How to code control statements**

**How to code Boolean expressions**

* How to use the relational operators
* How to use the logical operators
* How to compare strings

**How to code the selection structure**

* How to code if statements
* More examples of if statements
* How to code nested if statements
* How to use pseudocode to plan if statements

**Two illustrative programs**

* The Miles Per Gallon program
* The Invoice program

**How to use the iteration structure**

* How to code while statements
* How to code for statements
* How to code break and continue statements
* More examples of loops
* How to use pseudocode to plan a program

**Two illustrative programs**

* The Test Scores program
* The Future Value program

**Chapter 4 How to define and use functions and modules**

**How to define and use functions**

* How to define and call a function
* How to define and call a main() function
* The Future Value program with functions

**More skills for defining and using functions**

* How to use default values for arguments
* How to use named arguments
* When and how to use local and global variables

**How to create and use modules**

* How to create a module
* How to document a module
* How to import a module
* The Convert Temperatures program

**How to use standard modules**

* How to use the random module
* The Guess the Number game

**How to plan the functions of a program**

* How to use a hierarchy chart
* The hierarchy chart for the Pig Dice game
* The Pig Dice game with global variables
* The Pig Dice game with local variables

**Chapter 5 How to test and debug a program**

**An introduction to testing and debugging**

* The three types of errors that can occur
* Common Python errors

**Four techniques for testing and debugging**

* How to plan the test runs
* A simple way to trace code execution
* How to use top-down coding and testing to simplify debugging
* How to use the IDLE shell to test functions

**How to use the IDLE debugger**

* How to set and remove breakpoints
* How to step through the code
* How to view the stack

**Chapter 6 How to work with lists and tuples**

**Basic skills for working with lists**

* How to create a list
* How to get and set items
* How to add and remove items
* How to process the items in a list
* How lists are passed to functions
* The Movie List program

**How to work with a list of lists**

* How to create a list of lists
* How to process the items in a list of lists
* The Movie List 2D program

**More skills for working with lists**

* How to count, reverse, and sort the items in a list
* How to use other functions with lists
* How to copy, slice, and concatenate lists
* How to reassign a list (mutable)
* How to reassign a few elements in the list
* How to reassign a single element in the list
* How to delete the entire list
* How to delete a few elements from the list
* How to delete a single element from the list
* How to work with multi dimensional list
* How to concatenate lists
* How to do a multiplication operation with list
* How to work with memberships (i.e. apply the ‘in’ and ‘not in’ operators on a list)
* How to perform a list comprehension

**How to work with built-in list functions**

* How to work with len function
* How to work with max function
* How to work with min function
* How to work with sum function
* How to convert a different data type into a list
* How to work with any function
* How to work with all function

**How to work with tuples**

* How to create a tuple
* How to get items from a tuple
* How to work with tuples packing
* How to work with tuples unpacking
* How to slice a tuple
* How to traverse the tuple from the left using positive indices
* How to traverse the tuple from the right using negative indices
* How to delete a tuple
* How to reassign tuple
* How to work with len function
* How to work with max function
* How to work with min function
* How to work with sum function
* How to work with any function
* How to work with all function
* How to work with sorted function
* How to work with tuple function
* The Number Crunching program

**Methods on tuple**

* How to work with index method
* How to work with count method

**Operations on tuple**

* How to work with membership operation
* How to work with concatenation operation
* How to work with logical operation
* How to work with identity operation

**Chapter 7 How to work with file I/O**

**An introduction to file I/O**

* How file I/O works
* How to open and close a file
* How to work with different file open modes

**How to use text files**

* How to write a text file
* How to read a text file
* How to use a for statement to read each line of the file
* How to read entire file as a list
* How to read entire file as a string
* How to read each line of the file
* How to work with a list in a text file
* How to write the items in a list to a file
* How to read the lines in a file into a list
* How to write and read a list of numbers
* The Movie List 1.0 program

**How to use CSV files**

* How to write a CSV file
* How to read a CSV file
* How to modify the CSV format
* The Movie List 2.0 program

**How to use binary files**

* How to work with a binary file
* The Movie List 3.0 program

**Section 2 Other concepts and skills**

**Chapter 8 How to work with numbers**

**Basic skills for working with numbers**

* How floating-point numbers work
* How to use the math module

**How to format numbers**

* How to use the format() method of a string
* How to use the locale module
* How to fix rounding errors

**How to work with decimal numbers**

* How to use the decimal module
* The Invoice program with decimal numbers
* The Future Value program with decimal numbers

**Chapter 9 How to work with strings**

**Basic skills for working with strings**

* Unicode, indexes, slicing, duplicating, and multiline strings
* How to search a string
* How to loop through the characters in a string
* How to use basic string methods
* How to find and replace parts of a string
* The Create Account program

**How to split and join strings**

* How to split a string into a list of strings
* How to join strings
* The Movie List 2D program
* The Word Counter program

**The Hangman game**

* The user interface
* The hierarchy chart
* The wordlist module
* The hangman module

**Chapter 10 How to work with dates and times**

**How to get started with dates and times**

* How to create date, time, and datetime objects
* How to create datetime objects by parsing strings
* How to format dates and times
* How to work with spans of time
* The Invoice Due Date program
* The Timer program

**More skills for working with dates and times**

* How to get date and time parts
* How to compare date/time objects
* The Hotel Reservation program

**Chapter 11 How to work with dictionaries**

**How to get started with dictionaries**

* How to create a dictionary
* How to get, set, and add items
* How to delete items
* How to loop through keys and values
* How to convert between dictionaries and lists
* The Country Code program
* The Word Counter program

**More skills for working with dictionaries**

* How to use dictionaries with complex objects as values
* The Book Catalog program
* How to make use of dictionary comprehension
* How to create dictionaries with mixed keys
* How to use the dict() function
* How to declare an empty dictionary and add elements later

**Built-in functions on a dictionary**

* How to work with len function
* How to work with any function
* How to work with all function
* How to work with sorted function

**Built-in methods on a dictionary**

* How to work with keys method
* How to work with values method
* How to work with items method
* How to work with clear method
* How to work with copy method
* How to work with pop method
* How to work with popitem method
* How to work with fromkeys method
* How to work with update method

**Operations on dictionary**

* How to apply ‘in’ operators on a dictionary
* How to apply ‘not in’ operators on a dictionary

**Nested dictionary**

* How to work with nested dictionary

**Chapter 12 How to work with regular expressions**

* Introduction to regular expressions
* How to work with regular expressions basics
* How to work with meta characters
* How to understand the rules for a match

**Regular expressions functions**

* How to work with match function
* How to work with search function
* How to work with group extraction
* How to work with findall function
* How to work with findall function with files
* How to work with findall with groups

**Options**

* How to work with regular expression IGNORECASE
* How to work with regular expression MULTILINE
* How to work with regular expression DOTALL

**Greedy vs non-greedy matching**

* How to work with greedy matching
* How to work with non-greedy matching

**Substitution**

* How to work with substitution

**Compilation**

* How to compile a pattern for performance

**Usage of regular expressions**

* How to verify an email using regular expressions
* How to verify a phone number using regular expressions
* How to match a few date strings using regular expressions
* How to capture specific months of each date using regular expressions
* How to capture the first word of a given string
* How to capture the first two character of each word
* How to capture the domain type of given email-ids
* How to retrieve date from a given string
* How to capture all words of a string those starts with vowel
* How to split a string with multiple delimiters
* How to retrieve information from HTML file
* How to perform a simple web scraping using regular expressions
* How to parse information from a sample (mock) log file

**Chapter 13 How to work with modules**

**The sys module**

* How to pass string arguments through command-line to Python script using sys.argv
* How to display path (or Python PATH) set in the current system using sys.path
* How to get from standard input from user using sys.stdin
* How to write to standard output using sys.stdout.write
* How to write to standard error using sys.stderr.write
* How to exit the current flow of execution abruptly using sys.exit

**The getopt module**

* How to parse command-line parameters using getopt module

**The argparse module**

* How to parse command-line parameters using argparse module
* How to gracefully handle the absence and presence of parameters
* How to pass default value for an argument
* How to work with argparse argument help
* How to work with argparse optional arguments
* How to work with short names for optional arguments with argparse

**The os.path module**

* How to list files in a directory using os.listdir
* How to find specific file extensions (ex. \*.log, \*.txt) from a directory
* How to traverse a directory recursively using os.walk
* How to identity whether the entry is a file or a directory using os.path.isdir and os.path.isfile

**The os module**

* How to get the current directory
* How to change the current directory
* How to create a directory
* How to rename a directory
* How to remove a directory or a file
* How to join and split platform independent file and directory paths
* How to check if the directory or file (path) exists

**The operator module**

* How to perform logical operations using the operator module
* How to perform comparison operations using the operator module
* How to perform arithmetic operations using the operator module
* How to perform sequence operations using the operator module
* How to perform in place operations using the operator module

**The gzip module**

* How to compress the data using gzip
* How to uncompress the data using gzip
* How to set different amounts of compression level by passing a compress level argument
* How to read compressed data using gzip
* How to read a file and read only part of the data.

**Map and Lambda**

* How to work with map
* How to work with lambda expressions with map
* How to add two lists with map and lambda
* How to use reduce with lambda