**Course 1: Python Programming for Data Science**

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| **S.No.** | **Module Name** | **Topic** |
| Module: 1 | Introduction Data Science, Python | Need of AI/ML/DL/NLP/Data Science.  What is Data Science and why Data Science? |
| Applications and Components of data Science |
| Why Python for Data Science? |
| Basics of Algorithm/Pseudocode, Program,  Kinds of Programming Languages, Compilers, and Interpreters |
| Introduction to Python, Types of IDE (Anaconda) |
| Identifiers, Variables, Operators, Data Types, PIP, PEP |
| Conditions, Loops, Nested Loops. Programs on conditions and Loops |
| Module: 2 | Data Structures using Python | Strings: Introduction, functions, and operations on Strings, Application Programs on Strings. |
| List: Introduction, functions and operations on List, Application Programs on Lists.  Tuple: Introduction, functions, and operations on Tuple |
| Dictionaries: Introduction, functions and operations on Dictionaries, Application Programs on Dictionaries. |
| Sets: Introduction, functions, and operations on Sets, Applications on Sets, Frozensets |
| List Comprehension, Dictionary Comprehension, Set Comprehension |
| Module: 3 | Functions, Modules and Collections | Functions Defining and Invoking functions, Scope, Parameter types |
| Recursive functions |
| Built in Functions such as enumeration, zip, sorted, map, filter and Applications |
| Modules in Python, creating custom modules and calling them |
| Lambda functions |
| Collections, Iterators, Generators, Decorators |
| **Module: 4** | **Working with Databases and Text** | **File I/O operations: Reading and Writing data from various formats** |
| **Regular Expressions, Identifiers, Quantifiers. Application Programs on Regular expressions** |
| **Working with Databases: Databases and Data Science, SQLite database and Insert, Update, Delete, Retrieve operations,** |
| **Exception Handling: Need for Exception handling, Raising exceptions,** |
| Module: 5 | Object Oriented Programming using Python | Need for Object Orientation, OOPS basics, Principles of OOPS |
| Classes, Objects, Pass by reference, Self, Collection of objects, Constructors |
| Need for Encapsulation and Abstraction, Private Attributes, Getter, and Setter Methods– Python Implementation |
| Inheritance: Need for Inheritance, Kinds of Inheritance, Programs on Inheritance |
| Polymorphism Abstract methods, Overloading and Overriding |
| Module: 6 | Mathematical modelling for Data Science | Mathematical Computing with NumPy |
| Statistics for Data Science with NumPy |
| Probability for Data Science using Numpy |
| Module: 7 | Exploratory Data Analysis and Data Visualization | Data Manipulation and Analysis using Pandas |
| Exploratory Data Analysis with Pandas |
| Matplotlib and Seaborn libraries for Visualization |
| Module: 8 | GUI Programming | Web Programming using Flask.  Web Scraping |
| GUI programming TCL TK |
|  |  | Assertions and Unit Testing |