PYTHON-IN-DEPTH: Beginner to Expert

INCLUDING NUMPY, PANDAS AND MATPLOTLIB

Total hours required=48 (8 weeks course)

Introduction to algorithm to solve a numerical problem. Downloading latest free Python package from https://www.python.org/downloads/ under c-drive, Description of different components of Python, writing simple Python Code, basic syntax, editing, saving and running a script, data types, variables, assignments, arithmetic operators and expressions, writing comments, error messages, conditions, Boolean logic, logical operators, ranges, control statements: if-else, loops(for, while). Solving simple problems using Python language. **[3 hrs]**

Introduction to Lists, tuples and dictionaries, basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding and removing keys, accessing and replacing values, traversing dictionaries. Solving problems from assignment sheet. **[6 hrs]**

Introduction to String manipulations, subscript operator, indexing, slicing a string, string and number system, converting strings to numbers and vice versa. Solving problems. **[2 hrs]**

Introduction to user defined functions, arguments and return values, formal vs actual arguments, named arguments, recursive call, applications., Solving problems from Assignment sheet. **[2 hrs]**

Introduction to Data Files, Strings and text files in Python, manipulating files and directories, reading/writing text and numbers from/to file, creating and reading a formatted file(csv or tab-separated), Solving problems from assignment sheet. **[5 hrs]**

Introduction to Bit-wise operators : Bit wise or(|), Bit wise and (&), Bit wise XOR(^), Bit wise Complement(~), Bit wise Left Shift(<<), Bit wise right shift(>>), to convert number/character to bits, To convert data file to bits and vice versa. Solving problems from assignment sheet. **[2 hrs]**

Introduction to Computer Graphics using Python, Using simple in built functions : GraphWin(), Point(), Circle(), Line(), Rectangle(), Oval(), setFill(), setWidth(), draw(), getMouse(). Drawing simple diagrams using in-built functions in Python. **[3 hrs]**

Free download Anaconda Software from:
https://www.anaconda.com

Description of different components of Anaconda, writing python code in Jupyter notebook and run the code, Python MySQL Database Connection using MySQL Connector, Installing XAMPP Apache and MYSQL, Creating new database, table under MYSQL, inserting data in a table using Python code. Solving problems from assignment sheet.

[3 hrs]

Introduction to numpy, importing numpy in Python code, converting lists to array, array manipulation. Problem solving using Numpy. **[1 hr]**

Introduction to Pandas, importing pandas in Python code, Application of Pandas for data manipulation, solving problems from assignment sheet. Accessing csv files from Kaggle. **[2 hrs]**

Introduction to Matplotlib, importing matplotlib in python code, reading standard database from Kaggle, Converting database to csv file, drawing different types of graphs using matplotlib. Solving problems from assignment sheet. **[2 hrs]**

Advanced Features of Python Programming : 15 hrs

A. Implementation of Graph Theory algorithms (i) BFS, (ii) DFS, (iii) Floyd's Algorithm, (iv) Dijkstra's Algorithm
B. Implementation of Data Structure Algorithms : (i) Stack, (ii) Queue, (iii) Merge Sort, (iv) Quick Sort, (iv) Infix to postfix conversion
C. Image Processing : (i) Extraction pixels from RGB image, (ii) image resizing, (iii) image rotation, (iv) Edge Detection of Image, (v) Image Blurring, (vi) RGB to Grey and Binary image, (iv) Hand writing recognition.
D. Machine Learning in Artificial Intelligence : (i) Simple Linear regression, (ii) Multiple Linear regression, (iii) Polynomial Linear Regression, (iv) Naïve Bayes, (v) KNN Classifier, (v)Decision Tree, (vi)Random Forest
E. NLP Concepts: (i) Tokenization, (ii) Stemming, (iii) Lemmatization, (iv) stop words

Online Examination. Duration of Examination : **2 hrs**

References:

- Fundamentals of Python : First Programs, Author: Kenneth A. Lambert. Publisher: Course Technology, Cengage Learning , 2012, ISBN-13: 978-1-111-82270-5.
- Python Notes for Professionals , e-book : goalkicker.com
- Class notes will be supplied to all participants after every class through individual's email-id.