

ECE181:INTRODUCTION TO PYTHON

L:1 T:0 P:2 Credits:2

Course Outcomes: Through this course students should be able to

CO1 :: apply basic literals of Python programming for various applications.

CO2 :: employ the core data structures in Python like lists, tuples, and dictionaries for data manipulation.

CO3 :: employ NumPy and Pandas libraries to manipulate, process, and analyze numerical data.

CO4 :: articulate Matplotlib for data visualization and OpenCV for Image Processing.

CO5 :: develop projects for various real world applications using python.

CO6 :: construct a demonstrable presentation and compose a comprehensive technical report for the developed solution.

Unit I

Introduction : need for a programming language, introduction to python as a programming language, programming errors and debugging

Variables, Expressions and Statements : identifiers, variables, assignment statements, expressions, named constant, simultaneous assignment, boolean types, numeric data types, operators, operator precedence and associativity, augmented assignment operators, type conversion and rounding

Unit II

Conditionals and Iterations : conditional expressions, if statement, two way if - else, nested if and multi-way if-elif-else statement, for loop, while loop, nested loops, break and continue, random numbers

Functions and recursion : function calls, type conversion and coercion, math functions, adding new function, parameters and argument, recursion and its use

Unit III

Strings and Lists : string a compound data type, length, string traversal, string slices, comparison, find function, looping and counting, list values, length, membership, operations, slices, deletion, accessing elements, list and for loops, list parameters and nested list

Tuples and Dictionaries : tuples, operations on tuples, creating dictionary, adding-modifying-retrieving dictionary values, deleting items, dictionary methods, operations on dictionary

Unit IV

Array Operations using NumPy : arrays vs lists, data types, array operations, statistical functions, broadcasting

Unit V

Handling Data with Pandas : introduction to pandas, series, dataframe, working with csv files, operations using dataframes

Data Visualisation with Matplotlib : line plots, multiple subplots in one figure, histograms, bar charts, pie charts

Unit VI

Real-world applications : demonstration of real-world applications, OpenCV-based image operations, PyGame-based gaming creation, web-scraping-based url access, discussion on advanced toolboxes in python, data visualization, and storytelling

List of Practicals / Experiments:

List of Practicals

- Programs to define identifiers and variables, assignment statements, expressions, simultaneous assignment, boolean types, numeric data types, and operators
- Program to implement conditional expressions, if statement, two-way if-else, nested if and multi-way if-elif-else statement, for loop, while loop, nested loops, break and continue, random numbers
- Program to implement functions and recursions for problem solving
- Program to implement basic operations on data structures – strings

- Program to implement basic operations on data structures – lists
- Program to implement file handling operations – create, write, append, read, and display the contents of a text file.
- Program to implement basic operations on data structures - tuples and dictionaries.
- Program to implement a Student Attendance Management System using Python lists and dictionaries.
- Program to implement a Student Grade Management System using functions and dictionaries.
- Program to demonstrate NumPy library functions for basic array operations.
- Program to use Pandas for various data handling operations
- Program to implement data visualization with Matplotlib
- Program to implement real-world applications such as smart alarm scheduler, track mobile data usage daily, angry about the food quality in the mess, digital water intake tracker, LPU autorickshaw booking system, automated duty leave generator for event participants if the participant is within the given area, smart power control for empty classrooms

Text Books: 1. INTRODUCTION TO PROGRAMMING USING PYTHON by Y. DANIEL LIANG, Pearson Education India

References: 1. A BYTE OF PYTHON by SWAROOP CHITLUR H, PDF
2. PYTHON THE COMPLETE REFERENCE by MARTIN C BROWN, Tata McGraw Hill, India
3. PYTHON PROGRAMMING: USING PROBLEM SOLVING APPROACH by REEMA THAREJA, OXFORD UNIVERSITY PRESS