Course Code: 204-02
Course Title: Programming Skills using Python

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Course Title	Programming Skills using Python
Credits	4
Course Category	Major Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hours (2 Hours Theory + 4 Hours Practical)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2024-2025
Purpose of Course	The purpose of the "Programming Language in Python" course is to equip students with a solid foundation in Python programming. This course will cover fundamental programming concepts, data structures, and algorithms, while also introducing advanced topics such as object-oriented programming, file handling, and libraries for data manipulation. By the end of the course, students will be proficient in writing efficient, scalable, and maintainable Python code, preparing them for further studies or careers in software development, data analysis, and related fields. [Python codes can be executed using any open source IDE. This is not IDE specific course.]
Course Objective	iii) Understand and apply fundamental programming concepts using Python, including variables, control structures, and functions. iv) Develop proficiency in Python's data structures, such as lists, dictionaries, and sets, to solve complex problems. v) Implement object-oriented programming principles and utilize Python libraries for file handling, data manipulation, and web development.
Pre-requisite	Fundamental knowledge of computer programming using 'C' and Python language. Knowledge of Python IDE installation is recommended.
Course Outcomes	CO1: Students will be able to learn advanced programming concept of compiler based programming language. CO2: Students will be proficient working on conditional statements, iterative Statements and fundamentals of programming concepts using C and Python. CO3: Students will be able to represent compound data using lists, tuples and dictionaries in Python programs. CO4: Students will be able to develop real world application. CO5: Students will learn important libraries like Numpy, Pandas which are useful in Data analysis, Machine Learning.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

Course Content	**UNIT-1: Python Fundamentals** 2.5 Concepts of Interpreter based programming language 2.5.1 Structure of Python Programming language. 2.5.2 Python code Indention and execution 2.6 Python Variables

	2.6.1 Naming of variables and Dynamic declaration of variables 2.6.2 Comments in Python 2.6.3 Assigning values to multiple variables 2.6.4 Global variables 2.7 Python Data types 2.7.1 Text(str), Numeric Type(int, float, complex),Boolean(bool) 2.7.2 Setting Data types 2.7.3 Type conversion(int, float, complex),casting(int, float, str) 2.8 User defined function. 2.8.1 Defining function, Function with Parameters 2.8.2 Parameter with default value, Function with return value **UNIT-2: Python Strings and Operators** 3.3 Python Strings 3.3.1 Multiline string, String as character array, triple quotes 3.3.2 Slicing string, negative indexing, string length, concatenation 3.3.3 String Methods: (centre, count, join, len, max, min, replace, lower, upper, replace, split) 3.4 Operators 3.4.1 Arithmetic Operators(+,-,*,/,%,**,//) 3.4.2 Assignment Operators(=,+=,-=,/=,*=,//=) 3.4.3 Comparison Operators (==,!=,>,<,>=,<=) 3.4.4 Logical Operators(and, or, not) 3.4.5 Identity and member operators(is, is not, in, not in) **UNIT-3: Python conditional and iterative statements** 4.4 If statement, if..elif statement, if..elif…else statements, nested if 4.5 Iterative statements 4.5.1 While loop, nested while loop, break, continue statements. 4.5.2 for loop, range, break, continue, pass and Else with for loop, nested for loop. 4.6 List: creating list, indexing, accessing list members, range in list, List methods (append, clear, copy, count, index, insert, pop, remove, reverse, sort). **UNIT-4: Python Collections and Library** 5.3 Python Collections 5.3.1 Tuples: Declaring tuple, indexing tuple, changing tuple values, adding and removing data from tuple, Use of tuple() method to create tuple, count() and index() methods. 5.3.2 Sets: declaring set, access set data, set methods (add, clear, copy, discard, pop, remove, union, update). 5.3.3 Dictionary 5.1.3.3 Creating Dictionary, Adding, Accessing and Removing element 5.1.3.4 Dictionary methods: get(),pop(), popitem(),clear(),copy() 5.4 Introduction to Numpy and Pandas 5.2.3 Overview of numpy 5.2.3.1 Numpy methods (Mean, Median, Mode, Standard Deviation and Variance) 5.2.3.2 Implementation of Numpy methods on numeric data set

	created using list. **UNIT- 5: Handling CSV files using Python.** 5.1 Pandas Dataframe 5.1.1 Creating dataframe using list 5.1.2 Creating dataframe using dict of equal length list 5.1.2.1 Introduction to Python's 'csv' module 5.1.2.2 Reading data using csv file(read_csv()) 5.1.2.3 Read and write using 'csv.reader()' and 'csv.writer()' 5.1.2.4 Retrieving rows and columns from data frame using index 5.1.2.3 Retrieving rows and columns using loc and iloc functions. 5.1.2.4 Handling CSV files with different delimiters 5.2 Data Analysis and Visualization with CSV Files 5.2.1 Basic data analysis with Pandas: 5.2.1.1 Descriptive statistics, group by operations 5.2.2 Merging and joining CSV files 5.2.3 Data visualization with Matplotlib 5.2.4 Creating basic plots (line, bar, scatter) 5.2.5 Customizing plots (titles, labels, legends, colors) 5.2.6 Saving plots to files
Reference Books	1. "Python Crash Course" by Eric Matthes, No Starch Press, ISBN: 978-1593279288 2. "Automate the Boring Stuff with Python" by Al Sweigart, No Starch Press, ISBN: 978-1593275990 3. "Learning Python" by Mark Lutz, O'Reilly Media, ISBN: 978-1449355739 4. "Python for Data Analysis" by Wes McKinney, O'Reilly Media, ISBN: 978-1491957660 5. "Fluent Python" by Luciano Ramalho, O'Reilly Media, ISBN: 978-1491946008 6. "Core Python Programming" by R. Nageswara Rao, Dreamtech Press, ISBN: 978-9389510650 7. "Python Programming: A Modern Approach" by Vamsi Kurama, Pearson Education, ISBN: 978-9332556591 8. "Programming with Python" by T R Padmanabhan, Springer, ISBN: 978-8132236713 9. "Introduction to Computing and Problem Solving with Python" by Jeeva Jose and P. Sojan Lal, Khanna Publishing, ISBN: 978-9382609818 10. "Python: The Complete Reference" by Martin C. Brown, McGraw-Hill Education, ISBN: 978-0072127188
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. 50% External assessment.