**COURSE STRUCTURE**

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| **Course Code** |  | | | |
| **Course Category** | **Core** | | | |
| **Course Title** | **Python Programming** | | | |
| **Teaching Scheme and Credits Weekly load hrs.** | **L** | **T** | **Laboratory** | **Credits** |
| **4** | **--** | **--** | **4** |
| **Pre-requisites**:  Programming Skill, Object Oriented Programming | | | | |
| **Course Objectives:**   1. To understand and use the basic of python. 2. To understand advance concepts of python and able to apply it for solving the complex problems. 3. To understand the reading and writing data through file handling. 4. To understand basic database concepts in python. 5. To develop the critical thinking and analytical approach by using python libraries. | | | | |
| **Course Outcomes:**  **After completion of the course students will be able to**   1. Understand Demonstrate the concepts of python and modular programming. 2. Apply the concepts of concurrency control in python. 3. Solve the real-life problems using object-oriented concepts and python libraries. 4. Demonstrate the concept of IO, Exception Handling, database. 5. Analyze the given dataset and apply the data analysis concepts and data visualization. | | | | |
| **Course Contents:**  Python Basics, Lists, Tuples, Dictionaries, Functions, Pandas, NumPy, Matplotlib, NOSQL | | | | |
| **Learning Resources:**  **Reference Books:**   1. John V Guttag (2013), Introduction to Computation and Programming Using Python, Prentice Hall of India, 2013, ISBN: 9780262525008 2. R. Nageswara Rao (2016), Core Python Programming, Dreamtech Press, 2016, ISBN-13:9789351199427 3. Wesley J. Chun (2006), Core Python Programming – Second Edition, Prentice Hall, ISBN-13: 978-0132269933, ISBN-10: 0132269937 4. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser (2013), Data Structures and Algorithms in Python”, Wiley, 2013, ISBN: 978-1-118-54958-2, ISBN: 978-1-118-29027-9 (HardCover) 5. Kenneth A. Lambert (2011), Fundamentals of Python – First Programs, CENGAGE Publication, 2011, ISBN 1111822700, ISBN 9781111822705 6. Luke Sneeringer (2015), Professional Python, Wiley Inc.,2015, ISBN: 1119070856 7. Mark Lutz (2007), Learning Python, 3rd Edition, O’Reilly Media, Inc., 2007, ISBN-13:978-0-596-51398- 6, ISBN-10: 0-596-51398-4 | | | | |
| **Pedagogy:**  Participative learning, discussions, problem solving, assignments, Tutorials, | | | | |
| **Assessment Scheme:**  Class Continuous Assessment (CCA) 60 marks   |  |  |  |  | | --- | --- | --- | --- | | **MAT**  **(Mid Term Examination**  **MCQ Online Test /Direct Internal Examination)** | **FAT1**  **(Assignment, MCQ, Class Test, Presentation, Seminar)** | **FAT 2**  **(Assignment, MCQ, Class Test, Presentation, Seminar)** | **Total** | | 30 Marks | 15 Marks | 15 Marks | 60 Marks |   **Term End Examination:** 40 marks External | | | | |

**Syllabus:**

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| **Module** | **Contents** | **Work load in hrs.** | | |
| **Theory** | **Lab** | **Weightage** |
| 1 | **The Python Programming**: Features, Application, Variables, Identifier, Identifier Naming, Data Types, Comments in Python, Keywords, Literals, Type conversion, Functions, operators and its types, Order of Operations, Expressions, Scope of Variables,  **Functions:** Defining Functions, Calling Functions, passing arguments in function, call by reference in python, Types of Arguments: required arguments, Formal Arguments, Default Arguments, Variable- length Arguments, Keyword Arguments, Built-in Functions,  **Decision Making:** if statement, If. Else statement, Chained conditionals, Loops: For loop, while loop, Loop control statements: break, continue, pass, Nested loop, using else with for loop, Using else with while loop | 8 | -- | 12 Marks |
| 2 | **Strings:** Creating string, indexing and splitting, accessing values in strings, reassigning strings, deleting string, working with the Characters of a String, string operators, string formatting, Built-in String Methods, Length, The Slice Operator, String Comparison,  **Lists:** Accessing Elements in list, list length, List Slices, list methods, list slices, List Membership, Concatenation and Repetition, Objects and References, Aliasing and Copying, Cloning Lists, list loop, mutability, List Deletion, Objects and References, aliasing and, cloning list, list as parameters, List Membership, Concatenation and Repetition, Append versus Concatenate  Lists,  **Tuples:** creating Tuple, Tuple indexing and slicing, Deleting Tuple, Tuple operations and built-in functions, List Vs Tuple, Tuples and Mutability, Tuple Assignment, Tuples as arguments, Tuples as Return Values. | 10 | -- | 17 Marks |
| 3 | **Dictionaries**: Accessing the dictionary values, adding dictionary values, Operations on Dictionary, Dictionary Methods, Built-in Dictionary methods, Iterating Dictionary, Dictionary Keys, Aliasing and Copying,  **File Operations:** Opening a file, The close() method, The with statement, Writing the file, Read file through for loop, Read Lines of the file, Creating a new file, File Pointer positions, Modifying file pointer position, Removing the file, Creating the new directory, Changing the current working directory, Deleting directory, The file related methods,  **Python Class and Objects**: creating classes in Python, creating an instance of the class, Python Constructor, Types of Constructers, Python built-in class functions, Inheritance, Overloading Methods, Overriding methods, Data Hiding, Search Algorithms, Sorting Algorithms, Hash Tables. | 10 | -- | 17 Marks |
| 4 | **Regular Expressions**: Powerful pattern matching and searching, Power of pattern searching using regex in python, Real time parsing of data using regex, Password, email, URL validation using regular expression, Pattern finding programs using regular expression  **Exceptions**: Standard Exceptions, Exceptions Syntax, The try/except/else Statement, The try/finally Statement, Unified try/except/finally, The raise Statement, The assert Statement, with/as Context Managers String-Based Exceptions, Class- Based Exceptions, General raise Statement Forms, Nesting Exception Handlers, Exception Idioms, Exception Design Tips. Catch All Exceptions, Catch A Specific Exception, Catch Multiple Specific Exceptions, Clean-up After Exceptions | 8 | -- | 13 Marks |
| 5 | **Advance Function Topics:** Anonymous Function Lambda, Mapping Functions over Sequences: map, Functional Programming Tools: filter and reduce, List Comprehensions Revisited: Mappings.  **Modules and Packages:** Python Program Architecture, Module Creation, Module usage, Module Namespaces, Reloading Modules, Module Packages. Data Hiding in Modules, Enabling Future Language Features, Mixed Usage Modes, Changing the Module Search Path, The import as Extension, Relative Import Syntax, Module Design Concepts. | 8 | -- | 13 Marks |
| 6 | **Python Database Interaction:** Introduction to NoSQL database, Advantages of NoSQL database, SQL Vs NoSQL, Introduction to MongoDB with python, Exploring Collections and Documents**,** Performing basic CRUD operations with MongoDB and python | 6 | -- | 11 Marks |
| 7 | **Python for Data Analysis**  **NumPy:**  Introduction to NumPy, creating arrays, using arrays and Scalars, Indexing Arrays, Array Transposition, Universal Array Function, Array Input and Output  **Pandas:**  What are pandas? Where it is used? Series in pandas, pandas Data Frames, Index objects, Reindex, Drop Entry, Selecting Entries, Data Alignment, Rank and Sort, Summary Statics, Missing Data, Index Hierarchy  **Matplotlib:**  Python for Data Visualization, Introduction to Matplotlib, Visualization Tools | 10 | -- | 17 Marks |
| **Total** | | **60** |  | **100 Marks** |