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| **Course Title** | **Programming for Problem Solving using Python** | | |
| **Course Code** | **CSW208B** | | |
| **Credits** | (TOTAL:1.5) | | |
| **Course Coordinator /Instructor(s):** | Shailja Gupta | | |
| **Course Scheme:** | Lab (1.5) | | |
| **Course Type/ Nature:** | Domain Core/ Hard | | |
| **Term Offered:** | Even Semester (4th semester) | | |
| **Course Schedule:** | **Lab:**  3 per week. | | |
| **Course Assessment:** | **Formal Assessment:**  **Practical :**2 mid-term and 1 end semester test | | **Informal Assessment**  **Practical:** Viva, Lab Participation |
| **Relationship to other courses** | **Course Prerequisites** | NA | |
| **Assumed Knowledge** | Basic Programming Concept | |
| **Applicable for** | Machine Learning | |
| **Objective** | Students (A) would be able to understand (B) python programming (C) and to implement programming concepts to solve small real life problems using (D). | | |
| **Learning Outcomes (COs)** | Students would be able to  CO1 To impart understanding of basic programing concepts in Python programming language  CO2 To enable the student to comprehend given program scenario and apply different programming constructs  CO3 To apply object oriented concepts and programming techniques in Python programming language  CO4 To enable students to analyze the semantics of the given problem statement and apply programming techniques with database connectivity and maintenance  CO5 To integrate the learned and applied concepts into given python projects to produce real life solutions | | |

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| **Section** | **Topics** | **P** |
| **TOPIC** | **Section A:**. Introducing the Python language & Basic Operators | 10 |
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| **Section B:** Implementing custom functions & Understanding Strings | 12 |
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| **Section C:** Understanding File Operations | 12 |
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| **Section D:** Python DB Interaction | 8 |
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| **TOTAL** | **42** |

**LESSON PLAN**

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| **Week** | **Lecture Topics** | **Course outcome** | **Blooms Taxonomy** | **Program Outcome** |
| **1** | **Lab 1:**. Introducing the Python language, Understanding the Python shell, writing a simple program, Development environment setup, Configuring – Jupyter, interpreter, Introducing the Jupyter working environment, Concept of module and packages | CO1 | BT1, BT2, | PO1, PO2 |
| **2** | **Lab 2:** Basic Operators – Arithmetic, Relational, Assignment, Logical, Membership and Identity operators, Variables and Data Types, | CO2 | BT2, BT3 | PO1, PO2, PO3 |
| **3** | **Lab 3:**. Understanding Mutable and Immutable types, Working with various type – None, Boolean(True/False), Numeric(int, float, long), | CO2 | BT1. BT2, BT3 | PO1, PO2, PO3 |
| **4** | **Lab 4:**. Understanding the concept of header & suites in the language construct, Conditionals and inline syntax, Multiple assignments in variables, Working with data type conversion, Working with Loops – While & For Effects of break, continue, pass & else statement in various construct. | CO2 | BT1, BT2, BT3 | PO3 |
| **5** | **Lab 5:PT1** |  |  |  |
| **6** | **Lab4:** Understanding Strings in Python & different type of its delimiter, Working with special string operators & formatted strings, Exploring some useful built in string methods, Working with Date & Time, | CO2 | BT1. BT2, BT3 | PO1, PO2, PO3 |
| **7** | Lists,Tuples, Mapping(Dictionary) | CO2 | BT1. BT2, BT3 | PO1, PO2, PO3 |
| **8** | Implementing custom functions, Variable scope – Global vs. Local, Dealing with various function arguments – default, named and variable length arguments, Understanding the concept of pass by value and pass by reference, Returning multiple values from a function, Anonymous & Recursive function, | CO2 | BT1, BT2, BT3 | PO3 |
| **9** | Understanding Classes & Objects, and Exploring different components of a Class , Class inheritance & Method overriding, Working with multiple Inheritance, Understanding the Abstraction mechanism in Python, Built-in Class attributes, Exception handling, | CO3 | BT1, BT2,  BT3 | PO1, PO2 |
| **10** | **Lab 10: PT2** |  |  |  |
| **11** | Understanding File Operations, Working with the File Object for reading & writing, Object oriented programming in Python, | CO3 | BT3, BT1 | PO1, PO2 |
| **12** | Python DB Interaction. Python Demonstration: Reading and Writing CSV files, The Series Data Structure, Querying a Series, The Data Frame Data Structure, Data Frame Indexing and Loading, Querying a Data Frame, Indexing Data frames, Missing Values. | CO4 | BT1, BT2,  BT3, BT4 | PO1, PO5 |
| **13** | Mini Project | CO5 | BT4 |  |
| **14** | Mini Project | CO5 | BT4 |  |

**PROGRAM EDUCATIONAL OBJECTIVES:**

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| **Business Intelligence & its Applications** |  | | | | |
| **Preparation** | **Core Competence** | **Breadth** | **Professionalism** | **Learning Environment** |
| **√** | **√** | **√** | **√** | **√** |

**Teaching Methodologies:**

1. Lectures will be delivered in interactive mode.
2. Students will work individually and also in groups in tutorial classes to solve different kinds of problems.
3. Home assignments will help the learners in keeping abreast with the lecture modules.
4. Short test from time to time will help the learners to study and clear the concepts.

**Evaluation scheme:**

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| **Lab (Formal: Informal)** |  |
| **Evaluation criteria** | **Marks** |
| Test 1 (PT1) | 15 |
| Test 2 (PT2) | 15 |
| Test 3 (PT3) | 30 |
| **Evaluation criteria (Informal)** | **Marks** |
| Lab Performance  Lab Record | 15 |
|  | 75 |

**Text Books:**

1. Dave Kuhlman, “A Python Book: Beginning Python, Advanced Python, and Python Exercises”, December 2013.
2. Mark Lutz’s, “Learning Python”, O'Reilly, 2001

**Reference Book:**

1. Sahana Kumaraswamy, Roy Antony Arnoid G, “Assignment for Object Oriented Programming using Python”, Infosys, Dec 2015.

2. Lutz, Mark, and Mark Lutz. Programming python. Vol. 8. O'Reilly, 1996.

3.Sommerville, “Software Engineering”, Addison Wesley, 1999.

Program Outcomes (POs)

**PO1: Preparation:** To prepare graduates with strong fundamentals required for higher learning, teaching or other jobs.

**PO2: Core Competence:**Ability to approach problems in an analytical and rigorous way and apply appropriate mathematical skills in solving them.

**PO3: Breadth:** To utilize the wide range of mathematical concepts along with pure, applied, mathematical statistics and numerical techniques equipped with mathematical computer software

**PO4:Professionalism:** To work as team with professional ethical practices

**PO5:Learning Environment:**To develop confidence for lifelong self learning

**Bloom’s Taxonomy (BTs)**

**BT1- Knowledge:**Knowledge involves recognizing or remembering facts, terms, basic concepts, or answers without necessarily understanding what they mean.

**BT2-Comprehension:**Comprehension involves demonstrating understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating the main ideas.

**BT3-Applications:**Applying involves using acquired knowledge—solving problems in new situations by applying acquired knowledge, facts, techniques and rules. Learners should be able to use prior knowledge to solve problems, identify connections and relationships and how they apply in new situations.

**BT4-Analysis:**Analyzing involves examining and breaking information into component parts, determining how the parts relate to one another, identifying motives or causes, making inferences, and finding evidence to support generalizations.

**BT5-Synthesis:**Synthesizing involves building a structure or pattern from diverse elements; it also refers to the act of putting parts together to form a whole.

**BT6-Evaluation:**Evaluating involves presenting and defending opinions by making judgments about information, the validity of ideas, or quality of work based on a set of criteria.