

<b>DATA VISUALIZATION WITH PYTHON LAB</b>	
<b>Course Code: CSL48</b>	<b>Credits: 0:0:1</b>
<b>Pre – requisites: Nil</b>	<b>Contact Hours: 14</b>
<b>Course Coordinator:</b>	

### Course Contents

<b>WEEK</b>	<b>LECTURE</b>	<b>QUIZ</b>
1.	Course Introduction, Deep dive into lists, sets, dictionaries, and tuples; Time complexity analysis. Control Structures	
2.	Functional Programming in Python: Introduction to functions, lambda, map, filter, reduce, and decorators, Higher-order functions.	Quiz 1
3.	Classes, objects, inheritance, and polymorphism, Encapsulation, abstraction	
4.	Regular Expressions: Introduction to regex, pattern matching, and practical applications. Error Handling & Exceptions, Iterators & Generators	
5.	Python Modules & Packages, Working with Files	Quiz 2
6.	Introduction to NumPy	
7.	Introduction to Pandas	
8.	Data Cleaning & Transformation with Pandas	Quiz 3
9.	Advanced Pandas - I	
10.	Advanced Pandas- II	
11.	Matplotlib & Seaborn	Quiz 4
12.	Introduction to Ploty	
13.	Data Cleaning and Visualization Project	

**Note: Each Lab Session is of two hours duration/week**

### **Suggested Learning Resources**

### **Reference Books/ Web Links:**

1. Mark Lutz: Learning Python, 5<sup>th</sup> Edition, Orielly Publications 2013. ISBN978-1-4493-5573-9
2. John Zelle: Python Programming: An Introduction to Computer Science, 2<sup>nd</sup> Edition. 2009 ISBN 978-1-8879- 0299-1
3. Paul Barry, Head First Python, O'Reilly Publication, 2<sup>nd</sup> Edition 2016. ISBN978-1-4919-1953-8

4. Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython by WesMcKinny, O'Reilly Media, 2<sup>nd</sup> Edition 2017. ISBN 978-9-3521-3641-4

### Course Outcomes (COs):

At the end of the course, the students will be able to:

1. Apply Python programming concepts, including data structures, control structures, functional programming, and object-oriented principles, to develop efficient computational solutions. (PO-1, PO-2, PO-3, PO-5, PSO-2, PSO-3)
2. Utilize NumPy and Pandas for efficient data handling, cleaning, transformation, and analysis to solve real-world data science problems. (PO-1, PO-2, PO-3, PO-5, PSO-2, PSO-3)
3. Design and develop interactive data visualization solutions using Matplotlib, Seaborn, and Plotly to effectively communicate data-driven insights. (PO-1, PO-2, PO-3, PO-5, PSO-2, PSO-3)

### Course Assessment and Evaluation:

<b>Continuous Internal Evaluation (CIE): 50 Marks</b>		
<b>Assessment Tools</b>	<b>Marks</b>	<b>Course Outcomes addressed</b>
Lab Test	20	CO1, CO2, CO3
Project – Data Cleaning and Dashboard	10	CO1, CO2, CO3
Weekly Evaluation-Lab Record + Quiz (Q1+Q2+Q3+Q4)	20	-
<b>The Final CIE out of 50 Marks = Marks of Lab Record (10M) + Average Marks of 4 Quiz(10M)+ Marks scored in Lab Test(10) + Marks Scored in Project(10)</b>		
<b>Semester End Examination (SEE)</b>		
Course End Examination (One full question from the Lab Question Bank, Programs will be coded using Python and executed)	50	CO1, CO2, CO3

### Laboratory Plan:

1. Students must **submit weekly lab records** with completed exercises. Late submissions of lab records will result in **deductions in marks**.
2. 4 quizzes will be conducted throughout the semester. Quizzes will cover theoretical & coding concepts from previous weeks.

