PROFESSIONAL CORE COURSES (C)

Course Code	20PAIC51J	Course Name	PYTHON FOR DATA SCIENCE	Course Category	C	Professional Core	L	T	P	C
							3	0	2	4

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	
Course Offering Department		Data Book / Codes/Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Learn the different packages in Python for array processing
CLR-2 :	Know the different advanced data structures for data processing
CLR-3 :	Working with various data formats
CLR-4 :	Utilize appealing visualization options for exploratory analysis
CLR-5 :	Utilize data analytics options available in Python for real-time application development

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning 1	2	3
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)
CLO-1 :	Create different real time applications using the various packages	1	80	75
CLO-2 :	Create and explore different operations on advanced data structures	1	85	75
CLO-3 :	Handle different data formats from different sources of data	2	75	70
CLO-4 :	Create effective visualizations for data representation and analysis	2	85	80
CLO-5 :	Apply the data analytics features in real world problem solving	3	85	75

Program Learning Outcomes (PLO)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Disciplinary Knowledge	Critical Thinking	Problem Solving	Analytical Reasoning	Research Skills	Team Work	Scientific Reasoning	Reflective Thinking	Self-Directed Learning	Multicultural Competence	Ethical Reasoning	Community Engagement	ICT Skills	Leadership Skills	Life Long Learning
CLO-1 :	L	H	M	H	L	-	-	-	L	L	-	-	-	-	M
CLO-2 :	H	H	H	M	M	-	-	-	M	L	-	-	-	-	M
CLO-3 :	M	H	H	H	L	-	-	-	M	L	-	-	-	-	M
CLO-4 :	M	H	H	H	M	-	-	-	M	L	-	-	-	-	M
CLO-5 :	H	H	H	H	M	-	-	-	M	L	-	-	-	-	M

Duration (hour)		15	15	15	15	15
S-1	SLO-1	Introduction to Python programming language	Loops for and while – when and how to use	File handling: Reading a file, file functions	Introduction to Pandas.	Visualization- advantages and use cases
	SLO-2					
S-2	SLO-1	Overview of python Techniques- advantages/ disadvantages	User defined functions: Creating functions and calling them	Writing a file, saving files ,file functions	Data structure in pandas – Dataframe and Series	Working with Matplotlib to plot different vaisuals
	SLO-2					
S-3	SLO-1	Python IDE installation-windows/Linux And Python IDE overview	Custom functions: lambda and recursive functions	Working on different file formats	Accessing and slicing of series and dataframes	Working with Seaborn to plot different vaisuals
	SLO-2					
S 4-5	SLO1 SLO2	**Lab 1:** Python installation, checking IDE and compatibilities	**Lab 4:** Building programs to use functions and accessing them in python	**Lab 7:** Building python programs on file operations	**Lab 10:** Building programs to access the csv files as a dataframe and analyze the dataframe.	**Lab 13:** Building programs to visualize the dataframe in matplotlib and seaborn
S-6	SLO-2	Programming basics	Introduction to strings	OOPs concepts in python	Arithmetic and logical operations on dataframe	Univariate graphs for numeric and categorical data
	SLO-2	Variables declaration, operators and indentation				
S-7	SLO-1	Working with Lists – indexing , slicing, manipulations, operations	String manipulations	Object creation	Sorting and filtering of series and dataframes	Bivariate graphs for numeric and categorical data
	SLO-2					
S-8	SLO-1	Working with Tuples - indexing , slicing, manipulations, operations	String slicing	Inheritance	Joining and merging of Dataframes	Multivariate Graphs
	SLO-2					
	SLO-2					
S 9-10	SLO1 SLO2	**Lab 2:** Building programs to work with the data structures in python	**Lab 5:** Building programs to use strings functions and concepts in python	**Lab 8:** Building python programs with OOPs concepts	**Lab 11:** Perform different arithmetic ,logical, and filtering operations on dataframes	**Lab 14:** Building programs to visualize the univariate, bivariate and multivariate relation
S-11	SLO-1	Working with Sets	Datetime class in python	Introduction to Numpy, Creating array, attributes	Groupby operations on Dataframe	Choosing appropriate graphical techniques
	SLO-2					
S-12	SLO-1	Working with Dictionaries - indexing , slicing, manipulations, operations	Manipulation of date time functions	Indexing and slicing	Pivot tables to understand the relationship between variables in the data with different aggregation	Using graph to explore the data insights
	SLO-2					
S-13	SLO-1	Conditional statements-If, If-else, nested if else statements	Different class/methods associated with datetime	Iterating through array	Crosstab to understand the relationship between variables in the data	Introduction to dashboards
	SLO-2					
S 14-15	SLO1 SLO2	**Lab 3:** Building programs to work with the nested if statements with various data structures in python	**Lab 6:** Building programs to use functions in dates and times in python	**Lab 9:** Building programs in numpy and need to analyze the run time analysis for the same operations in python.	**Lab 12:** Perform groupby, pivot and crosstab aggregation on the dataframe.	**Lab 15:** Case study with all the appropriate graphs to visualize the relationship in the data.

Learning Resources	1. Grus, J. (2019). Data Science from Scratch, 2nd Edition. Place of publication not identified: O'Reilly Media, Inc. 2. McKinney, W. (2018). Python for data analysis: Data wrangling with pandas, NumPy, and IPython. O'Reilly Media, Inc. 3. Vanderplas, J. T. (2017). Python data science handbook: Essential tools for working with data. O'Reilly Media, Inc.

	Bloom's Level of Thinking	Continuous Learning Assessment (CLA) (60% weightage)					Final Examination (40% weightage)	
		CLA-1 (20%)		CLA-2 (25%)		#CLA-3 (15%)		
		Theory	Practice	Theory	Practice		Theory	Practice
Level 1	Remember Understand	20%	20%	15%	15%	20%	15%	10%
Level 2	Apply Analyze	20%	20%	15%	15%	40%	20%	20%
Level 3	Evaluate Create	10%	10%	20%	20%	40%	15%	20%
	Total	100 %		100 %		100 %	100 %	

#CLA-3 will be a Self-Learning Component and is generally a combination from among one or more of these options:

Assignments	Surprise Tests	Seminars	Multiple Choice Quizzes
Tech. Talks	Field Visits	Self-Study	NPTEL/MOOC/Swayam
Mini-Projects	Case-Study	Group Activities	Online Certifications
Presentations	Debates	Conference Papers	Group Discussions

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Dr Sai Adithya, Data Scientist, Great Learning	*Dr.I.Joe Louis Paul, Associate Professor, SSNCollege of Engineering*	*Dr.E.Poovammal, SRMIST* *Ms. K. Sornalakshmi, SRMIST* *Dr. M. Jeyaselvi, SRMIST*