BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
WORK INTEGRATED LEARNING PROGRAMMES
COURSE HANDOUT

Part A: Content Design

Course Title	Python Fundamentals for Data Science
Course No(s)	AIMLCPFDS/DSECLPFDS
Credit Units	**NO CREDITS; This is an audit course**
Course Author	Pravin S Pawar (2019)
Version No	2.0
Minor Edits	Parthasarathy P D (2021)

Course Description

The goal of the course is to introduce students to Python programming using hands on instruction. It will show how to install Python and use the Jupyter notebook and other IDE's (Integrated Development Environment) for writing programs. It is intended for students with little or no programming background.

Course Objectives

No	Objective
CO1	Introduce students with fundamental programming concepts of Python
CO2	Enable students to solve data problems using Python
CO3	Enable students to understand the role of python in Data Science

Textbook(s)/Reference(s):

No	Author(s), Title, Edition, Publishing House
T1	Charles Severance: Python for Everybody, Exploring Data in Python 3, CreativeCommons, 2016
T2	Jake VanderPlas: Python Data Science Handbook, Essential Tools for Working withData, O'Reilly Media, 2016
R1	Edouard Duchesnay: Statistics and Machine Learning in Python Release 0.2, 2018
R2	Wes McKinney: Python for Data Analysis, Agile Tools for Real World Data, O'ReillyMedia, 2013

Part B: Modular Content Structure

Session	Topics	Reference
	Saturday, April 8, 2023 – S1	
1	**Python Basics**	
1.1	**Setting up Python Environments**	**Python Documentation**
	Anaconda Distribution Spyder IDE Jupyter Notebooks Input / Output with Python	
1.2	**Getting familiarity with basic code constructs**	**T1 : Ch 2, Class Notes**
	Package imports Data Types & Type Casting Variables, Expressions & Statements	
	Saturday, April 15, 2023 – S2	
2	**Python Data Structures**	
2.1	**Immutable Data Structures**	**T1 : Ch 6, 10, Class Notes**
	Immutable Data Structures Strings Operations on String Familiarity with Tuples	
2.2	**Mutable Data Structures**	**T1 : Ch 8, 9, Class Notes**
	List List operations Familiarity with Sets Dictionary operations	
3	**Python Programming Constructs**	
3.1	**Expressions, Operations, and Decision Structures**	**T1 : Ch 2, 3, Class Notes**
	Boolean Expressions and Logical Operators Conditional and Alternative execution Chained and Nested execution Catching Exceptions with try and except	
	Saturday, April 29, 2023 – S3	
3.2	**Iterative Executions**	**T1 : Ch 5, Class Notes**
	While loops Infinite loops, break, continue For loops	
Self-Study	*Object Oriented Features supported by Python*	

4	**Functions and Files**	
4.1	**Functions**	**T1 : Ch 4, Class Notes**
	Functions calls Built in Functions Custom Functions Parameters and Arguments	
4.2	**Files**	**T1 : Ch 7, Class Notes**
	Opening files Reading files Operation on content of files Writing files	
	Sunday, April 30, 2023 – S4	
5	**SciPy Ecosystem**	**SciPy Documentation**
	Familiarity with SciPy Ecosystem NumPy Library SciPy Library Matplotlib Library	
5.1	**Multidimensional Arrays with NumPy**	**T2: Ch 2, Class Notes**
	Basics of NumPy Arrays Computation on NumPy Arrays Aggregations Structured Arrays	
5.2	**Data Exploration with Pandas**	**Pandas Documentation**
	Pandas Objects Data Indexing and Selection Reading files with Pandas Dataset Merges	
	Saturday, May 6, 2023 – S5	
5.3	**Data Exploration with Pandas II**	**T2 : Ch 3, Class Notes**
	Data Cleaning Data Transformation Data Filtering Aggregation and grouping	
6	**Data Visualizations**	
6.1	**Visualizations with Matplotlib**	**Documentation, Class Notes**
	Basic Plotting Life cycle of a Plot Subplots Plotting visuals	

	Saturday, May 13, 2023 – S6	
6.2	**Visualizations with Seaborn**	**Documentation, Class Notes**
	Visualizing statistical relations Plots for univariate and multivariate analysis Visualizing distributions Linear relationships with plots	
Recorded Videos for future use		
Basic Machine Learning Examples with Python		
	Introducing Machine Learning Familiarity with Scikit-learn library Linear Regression - Handcoding Linear Regression – with Scikit-learn	**Scikit-learn documentation** **T2 : Ch 5, Class Notes**

Additional Reading

1. **Python 3.* documentation**
2. **Numpy Documentation**
3. **Pandas Documentation**
4. **Matplotlib documentation**
5. **seaborn: statistical data visualization documentation**
6. **Scikit-learn documentation**

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