

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

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	rthon Programming Constructs	T1 . Ch 2 2 Class Notes
	pressions, Operations, and Decision Structures polean Expressions and Logical Operators	T1: Ch 2, 3, Class Notes
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	ained and Nested execution	
	tching Exceptions with try and except	
	erative Executions	T1 : Ch 5, Class Notes
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	inite loops, break, continue	
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Self-Study Obj	r loops	

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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			
5	SciPy Ecosystem	SciPy Documentation		
	Familiarity with SciPy Ecosystem			
	NumPy Library			
	SciPy Library			
	Matplotlib			
5.1	Library Multidimensional Arrays with NumPy	T2: Ch 2, Class Notes		
J.1	Basics of NumPy Arrays	12. Cli 2, Class Notes		
	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			
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			

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 Mad	chine Learning Examples with Python	
	Introducing Machine Learning	Scikit-learn
	Familiarity with Scikit-learn library	documentation
	Linear Regression - Handcoding Linear	T2: Ch 5, Class Notes
	Regression – with Scikit-learn	

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
