DISCIPLINE SPECIFIC ELECTIVE COURSE -3 (DSE-3)
V. 5.4. Applications of Data Science: A Case Study Approach

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Application of Data Science: A Case Study Approach, DSE 3, V. 5.4.	**4**	**0**	**0**	**4**	**Class XII pass with Mathematics**	**Linear Algebra; Probability and Statistics; Basic programming**

Learning Objectives

- Introduce the students to Python based toolkits
- Understand the application of mathematics concepts to data science
- Formulate hypothesis for the case study under consideration
- Inculcate problem solving mind-set among students

Learning outcomes

The students will be enabled to identify a case study (for e.g. weather forecasting, stock market prediction, sentimental analysis, crime prediction, etc) and apply the fundamentals of mathematics and programming languages. The students will also understand the use of various Python tools such as NumPy, Matplotlib, etc.

Practicals - (120 Hours)

The course will be conducted completely on a hands- on mode. The basic concepts will be explained and each concept will be augmented by small exercises on lab either using Python/ MATLAB or R. A case study would be identified to implement all the concepts. Following tasks will be done in the computer lab

- Introduction to programming tools (Python/ MATLAB/ R)
- Visualising Data through Bar Charts, Line Charts, Box Plots, Histogram
- Scrapping web for data (Eg, Various social media sites)
- Cleaning the data
- Using models like K nearest neighbours; Naïve Bayes, Linear and Logistic

Regression, Decision Trees, Neural Network, Clustering., Random forest to analyse the data

- Identifying a case study (for e.g. weather forecasting, stock market prediction, sentimental analysis, crime prediction, health data analytics etc) for a mini project

Essential/recommended/ suggested readings

- Data Science from Scratch: First principles with Python, Joel Grus, 2nd Edition, O'Rielly Media Inc, 2019. https://all3dp.com/2/blender-3d-printing-tutorial/
- Python Data Science Handbook: Essential Tools for working with Data, 2nd Edition, O'Rielly Media Inc, 2022
- Practical Statistics for Data Scientist, Peter Bruce, Andrew Bruce and Peter Gedeck, 2nd Edition, O'Rielly Media Inc, 2020
- Python for Data Science, L.M. John Paul Mueller, Wiley, 2019.

DISCIPLINE SPECIFIC ELECTIVE COURSE -3 (DSE-3)
V. 5.5. Urban Computing

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit-distribution of the course			Eligibility criteria	Prerequisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Urban Computing# DSE 3, V.5.5	**4**	**0**	**0**	**4**	**12th Pass**	**Programming languages, data Structure, Algorithm design and analysis**

Learning Objectives:

This course introduces an interdisciplinary filed, is the science of using computing technology in solving urban challenges such as crowds, traffic, and pollution, governance issues etc. Urban computing research also focuses on acquiring an understanding of the nature of urban phenomena, predict the future of cities, and plan their development.

Learning Outcomes:

- Learn to formulate challenges urban problems.
- Understand ways of data acquisitions, integration, and modeling skills necessary for urban computing research.