Course Name : Probability & Statistics

Syllabus

Week	Module Name	Description
1	Introduction to Statistics	In this module, you will be introduced to statistics and descriptive statistics. You will learn about various visualizations to understand the data. You will understand various measures of central tendency and measures of variability to analyze the given data for more insights.
2	Applications of Statistics	In this module, you will learn how to understand the data distributed statistically and also with the help of box plot. You will understand outlier and how to identify with help of quartiles and also with the help of boxplot
3	Elements of Probability	In this module, you will be introduced to the basics of set theory and probability. You will learn about the axioms of probability and conditional probability. You will understand the difference between dependent and independent events. You will also explore one of the important concepts in data science (machine learning), i.e., Bayes' formula.
4	Bayes theorem and Applications	In this module, you will be introduced to the concept of conditional probability which is the basic idea behind market basket analysis. And also yet another important concept of Machine learning i.e.Bayes theorem.
5	Random Variables	In this module, you will learn how to generalize the events and their outcomes by a variable, that is, a random variable. You will explore types of random variables. You will gain an understanding of a mathematical expectation. You will further learn about the procedure to find the mean and variance using mathematical expectation. This module also covers the probability distribution function.
6	Discrete Probability Distributions	In this module, you will learn about various discrete probability distributions. You will be able to understand Binomial and probability distributions with their corresponding probability distribution functions. You will also learn about the mean and variance of Binomial and Poisson distributions.
7	Continuous Probability Distributions	In this module, you will learn continuous probability distributions in general and normal/Gaussian distribution in particular. You will gain an understanding of the mean and variance of normal distribution. You will also explore the standard normal distribution with the help

		of normal distribution tables. Furthermore, you will be introduced to other continuous distributions like uniform distribution and Gamma distribution.
8	Joint Probability Distributions	In this module, you will learn probability distribution and probability density when two random variables are considered.
9	Sampling and Estimation	In this module, you will learn the importance of sampling and various sampling techniques. You will be introduced to sampling distribution, which plays an important role in understanding data. You will learn about the central limit theorem that will help you understand the use of normal distribution in many situations. Then, you will be introduced to the next step in sampling, that is, estimation. You will also gain an understanding of the t- and chi-square distribution.
10	Testing of Hypothesis - 1	In this module, you will learn how to identify a hypothesis and its validation using various techniques. The module discusses how sampling can be used as a part of hypothesis validation. You will also learn about the formation of a suitable hypothesis and its validation by using statistical techniques. Furthermore, you will be introduced to type 1 and type II errors to understand the level of significance and the power of the test.
11	Testing of Hypothesis - 2	In this module, you will continue learning the concept of hypothesis by considering the proportion as a statistic. The module discusses how one proportion with large sample and small sample cases are considered in this testing of hypothesis. You will further explore hypothesis validation involving several proportions using the chi-square test.
12	Correlation	In this module, you will learn how to understand the relation between two variables in the given data and the types of correlation that exists between two variables. You will be able to find coefficient correlation to establish this.
13	Regression	In this module, you will learn how to understand the relation between two variables in the given data and the types of correlation that exists between two variables. You will be able to find coefficient correlation to establish this. The module will also answer why it is important to use the given data for future prediction for which regression is helpful. This module will also help you understand simple linear regression with the help of normal equations and its matrix form.