Natural Sciences – II

One of the following options:

B. STAT-201- Statistics

Introduction of the Course

This course is designed for the students to provide them an introduction to statistical methods useful in understanding, presenting, and analyzing the types of data encountered from different fields. Importantly, the contents of the course provide statistical tools used in several disciplines like engineering, commerce, information technology, economics, agriculture, sociology, chemistry, medicine, health care, etc. Also, after completing the course students will be able to understand the kind of statistical tests used in different problems for decision making.

In the first part of the course, students will learn about sampling techniques used in the survey and the different types of study designs used in research. In the second part of the syllabus, students will learn about descriptive statistical methods frequently used in applied fields like health, education, engineering, psychology, communication, information technology, etc. In the third section, some of the aspects of the probability and probability distribution are presented to familiarize the students with the applications of the distribution theory. In the last section methods used in statistical decision making are presented that help the students to decide whether the patterns they see in the data are strong enough to draw inferences about the population under consideration.

Course Objectives

The main objective of the course is to give students an understanding of statistical methods and decision making based on real-life data. After completing the course the students will be able to critically think about the data, its analysis, and the decisions about the problem under consideration. They will be able to conclude the population more confidently.

Learning Outcomes

By the end of this course, students will be able to:

1. understand the key concepts of statistics.
2. compute various summary statistics and make use of the graphical techniques to represent data we come across in health sciences.
3. understand probability and distribution theory.
4. apply statistical methods in decision making.

Course Outlines

Unit – I

1.1 Introduction

Data and its Types, Applications of Statistics in different fields of Human Life, Population and Sample, Survey Sampling Techniques, Study Designs and Types.

1.2 Descriptive Statistics

Bivariate Frequency Distribution, Moments, Skewness and Kurtosis, Rate and Ratios, Relative Risk, Odds Ratios, Population Rates (Birth, Death, Mortality and Morbidity, Fertility), Population Ratio (Age, Sex, Dependency, Child-Women).

1.3 Probability and Probability Distributions

Conditional Probability, Random Variable, Probability Distribution, Mean and Variance of a Probability Distribution, Some Important Probability Distributions and Properties (Binomial, Hypergeometric, Poisson, Uniform, Normal).

Unit – II

2.1 Statistical Inference

Sampling Distribution, Estimation, Point and Interval Estimation, Hypothesis Testing, One Sample t-test for Mean, Two Samples t-test for Difference Between Means (Independent and Dependent), Chi-Square Test for Independence of Attributes, Test about Population Correlation Coefficient, Determination of Sample Size.