

Natural Sciences
General Education Course

Course Title: **Essentials of Statistics**
Course Code: **GSTA-201**
Credit Hours: **03**

Learning Outcomes

This course aims to provide students with:

1. The background knowledge of data analysis including the concepts related to time series data.
2. The knowledge of different methods in which changes over time can be numerically studied and evaluated.
3. The evaluation of demographic measures using standard rates and ratios.
4. The methods to study the relationship and dependence between variables.

Course Outline

1. Introduction

Variables, Types of variables, Averages (mean, median and mode), Measures of dispersion (variance and standard deviation).

2. Index Numbers

Introduction to index numbers, their uses and application in real life. Different forms like simple and composite Index numbers, Computation of index numbers by fixed based and chain base methods. Unweighted and weighted index number. Theoretical tests for index numbers (like time reversal tests, factor reversal test, circular test). Consumer price index number and sensitive price index numbers. Limitations of index numbers.

3. Vital Statistics

Meaning of vital Statistics, uses of vital statistics, registration of vital events in Pakistan. Study of different rates and ratios (like gender ratio, child ratio, birth and death ratios, population growth rate, death rates, age and gender specific death rates, infant mortality rate, case fatality rate, fertility rate, crude birth rate, specific birth rate, standardized death rate, reproduction rate, gross reproduction rate, net reproduction rate, general and total fertility rate), Shortcomings of vital statistics.

4. Correlation and Regression

Introduction to correlation and regression, scatter diagram, Pearson bivariate correlation, fitting of simple linear regression

5. Time Series Analysis

Concept and nature of Time Series data, different components of time series analysis (like secular trend, seasonal variation, cyclical fluctuation and systematic patterns). De-trending, de-seasonalization of data, forecasting and prediction.

Books Recommended:

1. Chaudhary, SM and Kamal, S. (2011) "Introduction to Statistical Theory" Parts I & II, 6th ed, Ilmi Kitab Khana, Lahore, Pakistan.
2. Frost, J. (2019). Introduction to Statistics. Statistics by Jim Publishing. <https://statisticsbyjim.com/basics/correlations>.
3. Rauf, M (2001). "Polymer's Modern Statistics", Polymer Publication, Urdu Bazar, Lahore.
4. Spiegel, M.R. Schiller, J.L. and Sirinivasan, R.L. (2001) "Probability and Statistics", 4th ed. Schaums Outlines Series. McGraw Hill. New York.