Course Title: **Basic Statistics**

**Duration: 6 weeks (video lessons) + 2 weeks (interaction)**

**Instructor: Dr. Arnab Chakraborty**

**Description:** In this course, you will learn and develop the necessary knowledge and skills in basic statistics that are needed for statistical analysis of data.

**Level:** Beginner

**Prerequisite/recommended Background:** Basic 10+2 Mathematics

**Course Learning Objectives:**

After completing this course, a learner will be able to

* Understand  the different types of data
* Use LibreOffice to work with data
* Understand and use different descriptive statistics
* Understand and use different graphical and textual ways of representing data

**Skills:** Familiarity with data, basic descriptive statistics and the LibreOfiice software.

**Topics/Modules:**

* Different types of data and ways to load/save/export data using LibreOffice.
* Graphical presentation of data: theory and practice
* Textual representation of data, histogram, contingency tables: theory and practice.
* Measures of central tendency: mean, median, mode etc. Concept of robustness.
* Measures of dispersion: Range, mean absolute deviation, semi-interquartile range and boxplot
* Bivariate data and measures of association. Skewness and curtosis.

**Course Final Assignment (Final assignment at the end of the Course)**

* **Title:**Basic Staistics
* **Type: Statistical**  Computations and theory
* **Prompt:**  You will be given problems on statistics which require counting ability, familiarity with LibreOfiice, skills in proper application of theory and ability to interpret results
* **Artifact:  Diagrams and Tables**

**Course Objectives (Learning outcomes for the specific Course):**

After completing this project, a learner will be able to

* Apply Basic Concepts of Statistical Theory for Understanding of Data
* Manipulate data using a computer
* Summarise and present data in a meaningful way.

Course Title: **Statistical Methods**

**Duration: 6 weeks (video lessons) + 2 weeks (interaction)**

**Instructor: Dr. Arnab Chakraborty**

**Description:** In this course, you will learn about some standard tools that are used for statistical inference.

**Level:** Intermediate

**Prerequisite/recommended Background:** Basic Statistics

**Course Learning Objectives:**

After completing this course, a learner will be able to

* understand  the concept of population, sample and sampling distribution
* understand the basic concept of statistical inference, parameter, estimation and testing
* estimate mean, proportions, dispersion
* perform t-tests, ANOVA tests, chi-square tests

**Skills:** Statistical inference.

**Topics/Modules:**

* Concept of population, sample, sampling distributions and estimation of mean, proportion and dispersion.
* Concept of test of statistical hypotheses, one-sample, two-sample and paired t-tests.
* Analysis of variance: the concept and methodology.
* Chi-square tests for goodness of fit and independence.
* Regression and least squares.
* Introduction to time series

**Course Final Assignment (Final assignment at the end of the Course)**

* **Title:**Statistical Methods
* **Type: Statistical**  Computations and theory
* **Prompt:**  You will be given problems on statistics which require deciding and implementing standard standard statistical inference tasks using LibreOfiice.
* **Artifact:  Data and plots.**

**Course Objectives (Learning outcomes for the specific Course):**

After completing this project, a learner will be able to

* Apply common techniques of statistical analysis to analyze data
* Understand some types of estimators.
* Understand some types of statistical tests.

Course Title:***Multivariate*** ***Statistics with R***

**Duration: 6 weeks (video lessons) + 2 weeks (interaction)**

**Instructor: Dr. Arnab Chakraborty**

**Description:** In this course, you will learn and develop the necessary knowledge and skills in multivariate statistics that are needed for statistical analysis of multidimensional data.

**Level:** Advanced

**Prerequisite/recommended Background: Basic statistics, R**

**Course Learning Objectives:**

After completing this course, a learner will be able to

* Understand the difference between multivariate and univariate data
* visualize multivariate data
* principal component analysis
* factor analysis
* Multidimensinal scaling

**Skills:** Analysing multivariate data using R.

**Topics/Modules:**

* Visualization of multivariate data: problems and solutions.
* Concept of dimension
* Principal Component Analysis
* Factor Analysis
* Multidimensional Scaling
* Correspondence analysis

**Course Final Assignment (Final assignment at the end of the Course)**

* **Title: *Multivariate*** Staistics with R
* **Type: Statistical**  Computation, visualization and interpretation
* **Prompt:**  You will be given problems on multivariate statistics which require familiarity with skills in proper application of theory and ability to interpret results
* **Artifact:  Data, program and plots.**

**Course Objectives (Learning outcomes for the specific Course):**

After completing this project, a learner will be able to

* Understand Concepts and methods of multivariate statistics.
* Perform standard analyese like principal component analysis, factor analysis etc.
* Visualize multivariate data.