**PROGRAM CODE: ST4A**

**PROGRAM TITLE: BACHELOR OFSCIENCE (HONOURS) – B.Sc. (HONOURS)**

**APPLIED STATISTICS AND ANALYTICS**

**SEMESTER I**

**COMMUNICATION SKILL**

**B.Sc. I Semester**

**Outcome:**

1. To make communication with the parties concerned
2. To write memorandum, circulars, notices, business letters, and business reports
3. To write resume and job application
4. To participate in group discussion and interviews

**DESCRIPTIVE STATISTICS**

**Program Title : B.Sc(Hons.) Hours per week : 3**

**Course Code: ST4A -101**  **No. of Credits : 4**

**Course Objectives:**

**The learning outcomes associated with this course are aimed at students being able :**

* To define and compute various measure of central tendency.
* To tabulate statistical information given in a descriptive form and use graphical techniques to interpret
* To define and compute measures of skewness and kurtosis.
* To develop a deeper understanding of the linear regression and its limitation.
* To compute the measures of the correlation coefficient that describes the strength and direction of an association between variables.

1. A pearson correlation that is measure of a linear association between two normally distributed random variables.
2. A spreaman rank correlation that describes the monotonic relationship between the two variables.

* To describe and explain the concept of partial and multiple correlation,
* To compute and interpret multiple and partial correlation,
* To test the significance and apply the correlation to the real world data.
* To understand meaning ,importance and methods of constructing index numbers.
* To understand fixed and Chain based Index Numbers.
* To understand laspeyre’s , Pasches’s and Fishers’s Ideal Index Number.

**B.Sc. I**

**ST4A-105: Fundamentals of Economics**

**Course Objectives:**

* To introduce the first year students to the basic concepts of microeconomics and macroeconomics.
* To explain economic concepts and theories related to the behavior of economic agents, markets, industry and firm structures, legal institutions, social norms, and government policies.

To gain an understanding of core economic principles and how they apply to a wide range of real-world issues.

**COURSE OUTCOMES** : Upon completing the course, students will be able to : -

* Demonstrate knowledge of the laws of supply and demand and equilibrium; and apply the supply and demand model to analyze responses of markets to external events.
* Evaluate economic issues and public policy by using economic models or data analysis while identifying underlying assumptions of the model(s) and limitations.

**B.Sc. Statistics(ASA)**

**ST4A-202 Sampling Theory and Applications**

**Course Outcomes**

The main objective of the sampling theory is to obtain optimum results, i.e., to construct maximum information about the characteristics of the population with the available sources at our disposal in terms of time, money and man-power by studying the sample values only.

By completing this course the students will learn to perform the following :

- To reduce variability within the sample.

- To collect the desired information about the universe in minimum time and high degree of reliability.

- To get the estimate precisely and reliability of estimate.

- How to use simple random sampling, stratified or systematic sampling techniques.

- To learn advantages and disadvantages of sampling methods of data collection.

**ST4A-203 Estimation Theory**

**Course Objective :** : The main objective of the Statistical Inference refers to the process of drawing conclusions from the model estimation. And another goal of this course is to make inferences (predictions or decisions) about certain characteristics (for example – mean, standard deviation) of one or more populations based on information contained in the samples from populations.

**Course Outcomes**

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

* Understand problem of statistical inference, problem of point estimation
* Properties of point estimator such Consistency, Unbiasedness, Sufficiency
* Obtain minimum variance unbiased estimator

Obtain estimators using estimation methods such as Maximum likelihood, Minimum chi square, method of moments. Method of scoring, Properties of maximum likelihood estimator

**B.Sc. III Sem. (Applied Statistics and Analytics)**

**ST4A-205: Macroeconomics**

**Course Objectives:**

* To identify the determinants of various macroeconomic aggregates such as output, unemployment, inflation, productivity and the major challenges associated with the measurement of these aggregates.
* To describe the main macroeconomic theories of short term fluctuations and long term growth in the economy.
* To explain how the rate of inflation is calculated and identifies the consequences of inflation.
* To critically evaluate the consequences of basic macroeconomic policy under differing economic conditions within a business cycle.

**ST4A-206: R Programming Credits: 3 (2-0-2)**

**Objective:** This course is an introduction to R, a powerful and flexible statistical language and environment that also provides more flexible graphics capabilities than other popular statistical packages.

After taking this course, students will be able to –

1. Use R for statistical programming, computation, graphics, and modelling ,
2. Write functions and use R in an efficient way,
3. Fit some basic types of statistical models,
4. Use R in their own research,
5. Be able to expand their knowledge of R on their own

**Course Outcomes:**

* Student will do Data manipulation - acquiring skills in flexible matrix manipulation
* Access online resources for R and import new function packages into the R workspace
* Scripting in such a way that the script can be used with minimal effort for similar datasets

and analyses and for especially large datasets

* Explore data-sets to create testable hypotheses and identify appropriate statistical tests
* Perform appropriate statistical tests using R
* Learn how to create high-quality figures, especially associated with more complex analyses

(e.g. three dimensional scatter plots, animated chart Trellis displays, etc.).

**Subject- Macro Economics**

**Code- ST4A-221**

**Course Outcome:**

**Upon completing the course, students will be able to:**

* **Apply the principle of Macroeconomics in explaining the behaviour of Macroeconomic**
* **variables at national as well as global level.**
* **Apply economic reasoning to understand the operation of an economy.**
* **Understand the roles of fiscal and monetary policy in fighting recessions and inflation.**
* **Understand the implications of interference in a market economy, including government policy.**

**B.Sc. IV Sem. (Applied Statistics and Analytics)**

**ST4A-222: Econometrics**

**Course Objectives:**

* To familiarize students with methods of data analysis including descriptive statistics, regression analysis, and advanced issues in econometrics.
* Trained students to interpret and critically evaluate the outcomes of empirical analysis by using standard methods like properties of least squares estimators and the statistical testing of hypothesis.

To expand knowledge of various statistical techniques to analyze data and better understand the selection of different statistical techniques for different research problems

**PROGRAM CODE: ST4A BATCH: 2020-23**

**ST4A-302 Multivariate Analysis and Non-parametric Methods**

The learning objectives include :

• Study of theoretical concepts of Bivariate Normal and Multivariate Normal Distributions along with their properties.

• Analyze multivariate data.

• Application of Non-Parametric methods of testing of hypothesis.

On completion of the course, students should have achieved the following -

* The understanding of basic concepts associated with Multivariate Normal Distributions and their properties with special emphasis on Bivariate Normal Distribution.
* Analyzing Multivariate data using data reduction techniques like Principal Component Analysis, Factor Analysis.
* Classification method namely Discriminant Analysis.

Testing of hypothesis using Non-Parametric tests like Median test, Runs test, U - test, Kruskal Wallis test, etc. and ability to use them judiciously for the testing of given data.

**ST4A-305: Fundamentals of Algorithms Credits: 3 (2-1-0)**

**Objective:** The main object of this course is to provide an introduction to create analytical

skills, to enable the students to design algorithms for various applications, and to analyse

the algorithms.

**ST4A – 325 Linear Models**

**Objective:**  The main objective of this course is students will learn the use of different useful tools used in regression analysis. They will learn about simple and multiple linear regression, non-linear regression and Generalize linear models (GLM) including logistic regression.

After learning this course, students will be able to :

• Understand the concept of Simple linear and Multiple linear regression

• Check for the violations of model assumptions using residual analysis and other statistical tests.

• Learn to interpret different types of plots such as residual plots, normal probability plots etc.

• Understand the problems of multicollinearity, variable selection and how to deal with them.

• Differentiate between linear and non-linear regression and how to apply them in real life situations.

• The use of R statistical software will be widely used for solving a wide range of problems. At the end of the course, students will become familiar with the implementation of regression models using R along with the interpretation of results using such implementation

**DS7E-702: Data Mining and Data Warehousing Credits: 4 (3-1-0)**

**Course Objective** The main objective of this course is to provide understanding of data warehouse fundamentals and data mining techniques for business applications.