



Department of Statistics
Rabindranath Tagore University
Hojai, Assam

SYLLABUS

Course Structure:

Year	Semester	Paper Code	Title of the Course	Total Credit
1st	1st	MIN-STA-1.1	Basic Statistical Method	4
	2 nd	MIN-STA-1.2	Basic Probability Theory and Distribution	4

Title of the Course : **Basic Statistical Methods**
Nature of the Course : **Minor**
Paper Code : **MIN-STA-1.1**
Total Credits : **04**
Distribution of marks : **60 (End Sem) (60T+25P) + 15 (In-Sem)**

COURSE OBJECTIVES:

- To be familiar with basic tools and techniques of descriptive Statistics.
- To apply the knowledge in the context of an applied topic such as index number.

UNITS	CONTENTS	L	T	P	Total Hours
1 (12 Marks)	Statistical Methods: Definition and scope of Statistics, concepts of statistical population and sample. Data: quantitative and qualitative, primary and secondary, attributes, variables, scales of measurement nominal, ordinal, interval and ratio. Presentation: tabular and graphical, including histogram and ogives, Categorical data: Attributes and different measures of their association.	08	01	-	09
2 (16 Marks)	Measures of Central Tendency: mathematical and positional. Measures of Dispersion: range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, absolute moments, factorial moments, skewness and kurtosis, Sheppard's corrections.	10	02	-	12
3 (16 Marks)	Bivariate data: Definition, scatter diagram, simple, partial and multiple correlation (3 variables only), rank correlation. Simple linear regression, principle of least squares and fitting of polynomials and exponential curves.	10	02	-	12
4 (16 Marks)	Index Numbers: Definition, construction of index numbers and problems thereof for weighted and unweighted index numbers including Laspeyre's, Paasche's, Edgeworth-Marshall and Fisher's. Chain index numbers, conversion of fixed based to chain based index numbers and vice-versa. Consumer price index numbers (Core and Headline).	10	02	-	12
5 (25 Marks)	List of Practicals 1. Graphical representation of data. 2. Problems based on measures of central	-	-	15	30

	tendency. 3. Problems based on measures of dispersion. 4. Problems based on combined mean and variance and coefficient of variation. 5. Problems based on moments, skewness and kurtosis. 6. Fitting of polynomials, exponential curves. 7. Karl Pearson correlation coefficient. 8. Correlation coefficient for a bivariate frequency distribution. 9. Lines of regression, angle between lines and estimated values of variables. 10. Spearman rank correlation with and without ties. 11. Partial and multiple correlations. 12. Planes of regression and variances of residuals for given simple correlations. 13. Planes of regression and variances of residuals for raw data. 14. Calculate price and quantity index numbers using simple and weighted average of price relatives. 15. To calculate the Chain Base index numbers. 16. To calculate consumer price index number.				
	TOTAL	38	07	15	75

Where, L: Lectures T: Tutorials P: Practicals

MODES OF IN-SEMESTER ASSESSMENT:

(15 Marks)

- One Internal Examination -
- Others (**Any one**) -
 - o Group Discussion
 - o Seminar presentation on any of the relevant topics
 - o Debate

10 Marks

5 Marks

LEARNING OUTCOMES:

After the completion of this course:

- Students are expected to develop a clear understanding of the fundamental concepts of descriptive Statistics.
- Students will also learn handling various types of data and their graphical representation.
- Students are expected to apply different measures of location and dispersion in real life problems.

- Students will also learn handling bivariate data and are expected to understand significance of various coefficients of correlation, fitting of linear/nonlinear curve and formulation index numbers.

SUGGESTED READINGS:

1. Goon A.M., Gupta M.K. and Dasgupta B. (2002): Fundamentals of Statistics, Vol. I & II, 8th Edn. The World Press, Kolkata.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Mood, A.M. Graybill, F.A. and Boes, D.C. (2007): Introduction to the Theory of Statistics, 3 rd Edn., (Reprint), Tata McGraw-Hill Pub. Co. Ltd, Delhi.
4. Barman. M. P., Hazarika. J, Bora. T (2021): Statistical Methods, Mahaveer Pub, Dibrugarh.

Title of the Course : **Basic Probability theory and Distribution**
Nature of the Course : **Minor**
Paper Code : **MIN-STA-1.2**
Total Credits : **04**
Distribution of marks : **60 (End Sem) (60T+25P) + 15 (In-Sem)**

COURSE OBJECTIVES:

- To be familiar with probability theory.
- To learn different methods of studying a theoretical distribution.
- To study useful probability distributions and their properties

UNITS	CONTENTS	L	T	P	Total Hours
1 (12 Marks)	Probability: Introduction, random experiments, sample space, events and algebra of events. Definitions of Probability– classical, statistical, and axiomatic. Conditional Probability, laws of addition and multiplication, independent events, theorem of total probability, Bayes’ theorem and its applications.	08	01	-	09
2 (16 Marks)	Random variables: discrete and continuous random variables, p.m.f., p.d.f. and c.d.f., illustrations and properties of random variables, univariate transformations with illustrations. Two dimensional random variables: discrete and continuous type, joint, marginal and conditional p.m.f, p.d.f., and c.d.f., independence of variables, bivariate transformations with illustrations.	10	02	-	12
3 (16 Marks)	Mathematical Expectation and Generating Functions: Expectation of single and bivariate random variables and its properties. Moments and Cumulants, moment generating function, cumulant generating function and characteristic function. Uniqueness and inversion theorems (without proof) along with applications. Conditional expectations.	10	02	-	12
4 (16 Marks)	Standard probability distributions: Binomial, Poisson, geometric, negative binomial, hypergeometric, uniform, normal, exponential, Cauchy, beta and gamma along with their properties and limiting/approximation cases.	10	02	-	12
5	List of Practicals	-	-	15	30

(25 Marks)	1. Fitting of binomial distribution. 2. Fitting of Poisson distribution. 3. Fitting of geometric distribution. 4. Fitting of negative binomial distribution. 5. To find the ordinate for a given area for normal distribution. 6. Fitting of normal distribution. 7. Fitting of exponential distribution.				
	TOTAL	38	07	15	60

Where, L: Lectures T: Tutorials P: Practicals

MODES OF IN-SEMESTER ASSESSMENT:

(15 Marks)

- One Internal Examination -
- Others (**Any one**) -
 - o Group Discussion
 - o Seminar presentation on any of the relevant topics
 - o Debate

10 Marks

05 Marks

LEARNING OUTCOMES:

After the completion of this course:

- Students should have developed knowledge of the role of probability theory in Statistics.
- Students are expected to learn useful probability distributions in statistical analyses.

SUGGESTED READINGS:

1. Hogg, R.V., Tanis, E.A. and Rao J.M. (2009): Probability and Statistical Inference, Seventh Ed, Pearson Education, New Delhi.
2. Miller, Irwin and Miller, Marylees (2006): John E. Freund's Mathematical Statistics with Applications, (7th Edn.), Pearson Education, Asia.
3. Myer, P.L. (1970): Introductory Probability and Statistical Applications, Oxford & IBH Publishing, New Delhi.