



(Bachelor of Science in Statistics) (Bachelor of Science)
(B. Sc.) (Statistics) Semester (III)

Course Code	US03CSTA51	Title of the Course	DESCRIPTIVE STATISTICS
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none"> 1. To understand the purpose of descriptive statistics 2. To compute various measures of central tendency, dispersion with its merits and demerits and its usefulness in real life. 3. To explain the problems arising in the construction of index numbers, importance of an index numbers. 4. To perform basic demographic analyses using various techniques. 5. To learn the main theories used to understand population studies.
--------------------	----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Course Content		
Unit	Description	Weightage* (%)
1.	<p>Analysis of Quantitative data - I</p> <p>Types of data : Quantitative data : Discrete and Continuous, Qualitative data : Nominal and Ordinal</p> <p>Measures of central tendency : Mean, Median, Mode, Geometric mean, Harmonic mean, Weighted mean, Combined mean, Merits & demerits, Properties (with proof), Real life examples</p>	25
2.	<p>Analysis of Quantitative data - II</p> <p>Partition values and their graphical representation</p> <p>Measures of Dispersion : Range, Quartile derivation, Mean Derivation, Standard derivation, Coefficient of variation(C.V), Merits & Demerits, Properties (with proof), Box – and – whisker plot, Lorenz curve, Stem – and – Leaf diagram</p> <p>Moments : Raw moments, Central moments, Relationship between raw and central moments, Skewness, Kurtosis, Real life examples</p>	25
3.	<p>Index numbers : Introduction, Uses of index number, Steps for construction of index numbers, Problems in the construction of index numbers, Methods of constructing index numbers, Simple (Unweighted) Aggregate method, Weighted Aggregate method, Laspeyre's Price Index, Paasche's Price Index, Fisher's Price Index, Marshall Edgeworth Price Index, Tests of consistency of Index number, Time reversal test, Factor reversal test</p>	25





4.	Vital Statistics : Uses of Vital statistics and methods of collecting vital statistics Measurement of Mortality: Crude Death Rate (CDR), Specific Death Rate (SDR), Standardized Death Rate (STDR) Measurement of Fertility: Crude Birth Rate (CBR), General Fertility Rate (GFR), Specific Fertility Rate (SFR), Total Fertility Rate (TFR) Measurement of population growth, Methods of measuring population growth, Crude rate of natural increase, Vital index, Gross Reproduction Rate (GRR)	25
----	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	----

Teaching-Learning Methodology	
-------------------------------	--

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to/impart	
1.	Understand the fundamental statistics concepts and its applications and to organize, manage and present the data.
2.	Knowledge of various types of data, their organization and evaluation of summary measures such as measures of central tendency and dispersion.
3.	Understand the uses of index numbers, Unweighted and weighted index numbers.
4.	Commonly used measures of demography pertaining to its three basic aspects, viz, the mortality, and fertility and population growth.





Suggested References:

Sr. No.	References
1.	Gupta S.C. : Fundamentals of Statistics
2.	Gupta S.C. : Fundamentals of Applied Statistics
3	Gupta S.C. and V.K.Kapoor : Fundamentals of Mathematical Statistics
4	Agarwal B.L. : Basic statistics

On-line resources to be used if available as reference material

On-line Resources





(Bachelor of Science in Statistics) (Bachelor of Science)
(B. Sc.) (Statistics) Semester (III)

Course Code	US03CSTA52	Title of the Course	ELEMENTS OF PROBABILITY THEORY
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none"> 1. Understand the basic principles of probability including the set theory, conditional probability, Bayes' theorem and its applications in real life problems. 2. Distinguish between independent and correlated random variables. 3. Distinguish between discrete, continuous and mixed random variables and be able to represent them using probability mass, probability density and cumulative distribution functions.
--------------------	-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Course Content		
Unit	Description	Weightage* (%)
1.	Probability : Concept of Set theory, Permutation & combination, Random experiment , sample space, Events, Types of sample space, Meaning and definition of probability - classical & axiomatic, Laws of probability (with proof), Conditional probability and independent events, Law of total probability, Bayes' theorem, Examples	25
2.	Random variables and probability distribution : Random variable, Types of r.v : Discrete and Continuous, Probability mass function (p.m.f), Probability density function (p.d.f), Distribution function (c.d.f), Median, mode and partition values	25
3.	Mathematical Expectation: Definition, Properties (with proof), Moments, measures of central tendency, dispersion, skewness and kurtosis, Moments and Generating functions (non - standard distributions), Probability generating function (p.g.f), moment generating function (m.g.f.) and its properties, cumulant generating function(c.g.f.)	25
4.	Bivariate distribution :Joint, marginal and conditional p.m.f of two random variables, Joint, marginal and conditional p.d.f of two random variables, Independence of two random variables (examples-nonstandard distribution), Product moments, Correlation, Conditional mean and variance	25

Teaching-Learning Methodology	
-------------------------------	--





Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events.
2.	Acquire knowledge related to concept of discrete and continuous random variables and their probability distributions including mathematical expectations and moments

Suggested References:	
Sr. No.	References
1.	Gupta S.C. and Kapoor V.K. : Fundamentals of Mathematical Statistics
2.	Mood A.M. and Graybill F.A. and Boes D.C.E.: Introduction to theory of statistics
3	Hogg and Craig: Introduction to Mathematical Statistics
4	Biswas Purna Chandra: Probability & Statistics (PHI Edition)

On-line resources to be used if available as reference material
On-line Resources





(Bachelor of Science in Statistics) (Bachelor of Science)
(B. Sc.) (Statistics) Semester (IV)

Course Code	US04CSTA51	Title of the Course	STATISTICAL TECHNIQUES
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. To study causal relationship between two related variables and measure the strength of relationship between two variables.2. Understand the line of best fit as a tool for summarizing a linear relationship and predicting for the future.3. To provide basic idea and tools of Statistical Quality Control4. Understand the fundamental advantage and necessity of forecasting in various situations
--------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Course Content		
Unit	Description	Weightage* (%)
1.	Curve fitting: Principle of least squares, Fitting of (i) $Y = a + bX$ (ii) $Y = a + bX + cX^2$ (iii) $Y = ab^X$ (iv) $Y = aX^b$, Correlation, Objectives, Definition, Methods of studying correlation, Scatter diagram method, Karl- Pearson's correlation coefficients and its properties (with proof), Spearman's Rank Correlation coefficient and its properties (with proof), Examples	25
2.	Multiple, Partial correlation (for 3 variables only) and Regression, Multiple correlation, Partial correlation, Examples, Regression, Meaning and importance, Derivation of both the regression lines and properties of regression coefficients (with proof), Examples, Multiple linear regression with two independent variables	25
3.	Time series Analysis: Components, Additive and Multiplicative models, Calculation of trend using, Free hand curve, Semi averages method, Moving average, Least squares method, Calculation of seasonal indices using, Simple Average, Ratio to Trend, Ratio to Moving Average, method	25





4.	Statistical Quality Control (SQC): Introduction, Types of Control charts, For Variables: \bar{X} and R Charts, For Attributes: p , np and C charts	25
----	--------------------------------------------------------------------------------------------------------------------------------------------------------------	----

Teaching-Learning Methodology	
-------------------------------	--

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	learn how to apply linear regression models in practice
2.	understand and interpret the correlation between two variables
3.	understand the importance and components of time series and measures to analyse time series data.
4.	understand the basic concepts of quality, quality control and tools to improve quality
5.	demonstrate the ability to use and interpret control charts for variables and attributes

Suggested References:	
Sr.	References





No.	
1.	Gupta S.C. and Kapoor V.K. Fundamentals of applied statistics
2.	Ken Black, Business Statistics (4 th edition) Willey student edition
3	Gupta S.C, Fundamentals of statistics by S.C. Gupta
4	Douglas C. Montgomery : Introduction to Statistical Quality Control Wiley student edition

On-line resources to be used if available as reference material
On-line Resources





**(Bachelor of Science in Statistics) (Bachelor of Science)
(B. Sc.) (Statistics) Semester (IV)**

Course Code	US04CSTA52	Title of the Course	PROBABILITY DISTRIBUTIONS
Total Credits of the Course	04	Hours per Week	04

Course Objectives:	<ol style="list-style-type: none">1. To study various discrete and continuous probability distributions and its applications in various real life situations.2. To identify the appropriate probability model that can be used.
--------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

Course Content		
Unit	Description	Weightage* (%)
1.	Discrete probability distributions: Bernoulli distribution, Binomial distribution, Poisson distribution, Geometric distribution, Negative binomial distribution, Hyper geometric distribution, Discrete uniform distribution, Mean variance, m.g.f, p.g.f and c.g.f. and its applications	25
2.	Continuous probability distributions: Continuous uniform distribution, Normal distribution, Mean variance, m.g.f, p.g.f and c.g.f. and its applications, Exponential distribution, Gamma distribution, Beta distribution of first and second kind, Mean variance, m.g.f, p.g.f and c.g.f. and its applications	25
3.	Properties and Applications of Standard Distributions: Normal distribution as a limiting case of Binomial and Poisson distribution (without proof). Additive properties of Bernoulli, Binomial, Poisson and Normal distribution and its applications.	25
4.	Sampling from Normal distribution: Sampling distributions of Mean and variance, Chi-square, t, and F distributions and examples	25

Teaching-Learning	
-------------------	--





Methodology	
-------------	--

Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written / Practical Examination (As per CBCS R.6.8.3)	15%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance (As per CBCS R.6.8.3)	15%
3.	University Examination	70%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Have knowledge related to concept of discrete and continuous random variable and its probability distributions including expectations and moments
2.	Knowledge of important discrete and continuous probability distributions and their interrelations, if any.

Suggested References:	
Sr. No.	References
1.	Gupta S.C. and Kapoor V.K. Fundamentals of Mathematical Statistics
2.	Richard Johnson and Gouri Bhattacharya, Statistics-Principles and methods
3	Robert V. Hogg and Elliot Tanis : Introduction to Mathematical Statistics Fourth Edition

On-line resources to be used if available as reference material
On-line Resources





SARDAR PATEL UNIVERSITY
Vallabh Vidyanagar, Gujarat
(Reaccredited with 'A' Grade by NAAC (CGPA 3.25))
Syllabus with effect from the Academic Year 2022-2023

