SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS)

SALEM – 16
Reaccredited with 'B++' Grade by NAAC
(Affiliated to Periyar University)

DEPARTMENT OF STATISTICS

OUTCOME BASED SYLLABUS
B.Sc. Statistics
(From the academic year 2025 – 26 onwards)

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS), SALEM – 16.
DEPARTMENT OF STATISTICS
B.Sc. STATISTICS
PROGRAMME STRUCTURE UNDER CBCS
(From the academic year 2025-26 onwards)
Total Credits: 140 + Extra Credits (Maximum 28)

I - SEMESTER

Part	Course	Course Title	Code	Hours per week	Credit
I	**Language**	Tamil/Hindi/Sanskrit	25ULTC1/ 25ULHC1/ 25ULSC1	6	3
II	**English**	General English – I	25ULEC1	6	3
III	**Core Course – I**	Descriptive Statistics	25USTCC1	5	5
	Core Course – II	Probability Theory	25USTCC2	5	5
	Elective – I Generic Course	Theory of Equations and Differential Calculus	25USTMGEC 1	4	3
IV	**Skill Enhancement Course (NME 1)**	Basics` of Statistics	25USTSEC1	2	2
	Skill Enhancement (Foundation Course)	Introductory Statistics	25USTSEFC	2	2
				30	**23**
V ***(Extra Skills)***	• ***Articulation and Idea Fixation Skills*** • ***Physical Fitness Practice – 35 hours per semester*** ***Advanced Diploma Course in Statistical Methods Level – I: Certificate Course 100 hours per Year***				

II - SEMESTER

Part	Course	Course Title	Code	Hours per week	Credit
I	**Language**	Tamil/Hindi/Sanskrit	25ULTC2/ 25ULHC2/ 25ULSC2	6	3
II	**English**	General English – II	25ULEC2	6	3
III	**Core Course – III**	Matrix and Linear Algebra	25USTCC3	5	4
	Core Course – IV	Distribution Theory	25USTCC4	4	4
	Generic Course Allied – II	Integral Calculus and Laplace Transforms	25USTMGEC2	3	3
		Theory of Equations and Laplace Transforms using Sagemath Practical	25USTMGECQ	2	2
IV	**Skill Enhancement Course (NME I1)**	Statistics in Ancient India	25USTSEC2	2	2
	Skill Enhancement (SEC III)	Basic Statistics: Practical - I (Problems from CORE COURSE I, II, III and IV)	25USTSECQ3	2	2
				30	**23**
• ***Articulation and Idea Fixation Skills*** • ***Physical Fitness Practice – 35 hours per semester***					
• ***Advanced Diploma Course in Statistical Methods*** ***Level – I: Certificate Course 100 hours per week***					

SEMESTER III

Part	Course	Course Title	Code	Hours per week	Credit
I	**Language**	Tamil Hindi Sanskrit	25ULTC3 25ULHC3 25ULSC3	6	3
II	**English**	General English – III	25ULEC3	6	3
III	**Core Course – V**	Estimation Theory	25USTCC5	5	5
	Core Course – VI	Sampling Techniques	25USTCC6	5	5
	Discipline Specific Course Elective – I	Numerical Methods	25USTDSEC1	4	3
IV	**Skill Enhancement Course IV**	Data Analysis using MS EXCEL	25USTSECQ4	2	1
	Skill Enhancement V	Estimation and Sampling Techniques: Practical (Problems from CORE COURSE V and VI)	25USTSECQ5	2	2
		Environmental Studies			
				30	**22**
• **Articulation and Idea Fixation Skills** • **Physical Fitness Practice – 35 hours per semester**					
• **Advanced Diploma Course in Statistical Methods** • **Level – II: Diploma Course 100 hours per week**					

B.Sc. Statistics : Programme Outcome, Programme Specific Outcome and Course Outcome

Statistics is the study of Data and extracting knowledge in the data using various methods and techniques, analyze and interpret data, taking data driven predictions and decisions. It also helps data collection through sampling techniques, that is to collect data focusing on problem solving, and presenting it with wider scope of application in science, social sciences, medical science, life sciences, country's official statistics etc. Statistical methods are used as research methodology in all most all domains. The key core areas of study in Statistics include Descriptive Statistics, Probability Theory, Sampling techniques, Matrix and Linear Algebra, Distribution Theory, Estimation Theory, Testing of Statistical hypotheses, Stochastic process, Regression analysis, Design of Experiments, Demography and Official Statistics. The Bachelor's Degree B.Sc. Statistics is awarded to the students on the basis of knowledge, understanding, skills, attitudes, values and academic achievements expected to be acquired by learners at the end of the Programme. Learning outcomes of Statistics are aimed at facilitating the learners to acquire these attributes, keeping in view of their preferences and aspirations for gaining knowledge of Statistics.

Bachelor's degree in Statistics is the culmination of in-depth knowledge in both theoretical and practical methods and techniques of Statistics. This also leads to study of related areas like Computer science, Industrial Statistics, Mathematical Statistics, Business Statistics and many more. Thus, this programme helps learners in building a solid foundation for higher studies in Statistics. The skills and knowledge gained have intrinsic aesthetics leading to proficiency in analytical reasoning. This can be utilized in Statistical modelling and solving real life problems.

Students completing this programme will be able to present Statistics clearly and precisely, make abstract ideas precise by formulating them in the language of Statistics, describe Statistical ideas from multiple perspectives and explain fundamental concepts of Statistics to those non-Statistics users.

Completion of this programme will also enable the learners to join teaching profession, enhance their employability for government jobs, jobs in banking, insurance and investment sectors, data analyst jobs, entrepreneurship, business and research areas and jobs in various other public and private enterprises.

Programme outcomes (PO) of B. Sc degree programme in Statistics

- **Scientific aptitude will be developed in Students**
- **Students will acquire basic Practical skills & Technical knowledge along with domain knowledge of different subjects in the science & humanities stream.**
- **Students will become employable; Students will be eligible for career opportunities in education field, Industry, or will be able to opt for entrepreneurship**
- **Students will possess basic subject knowledge required for higher studies,professional and applied courses**
- **Students will be aware of and able to develop solution-oriented approach towards various Social and Environmental issues.**
- **Ability to acquire in-depth knowledge of several branches of Statistics and aligned areas. This Programme helps learners in building a solid foundation for higher studies in Statistics**
- **The skills and knowledge gained leads to proficiency in analytical reasoning, which can be utilized in modelling and solving real life problems.**
- **Utilize Statistics to solve theoretical and applied problems by critical understanding, analysis and synthesis.**
- **To recognize patterns and to identify essential and relevant aspects of problems.**
- **Ability to share ideas and insights while seeking and benefitting from knowledge and insight of others.**
- **Develop students into responsible citizens in a rapidly changing interdependent society.**

Programme Specific Outcomes (PSO) of B. Sc Degree programme in Statistics

1. **Think in a critical manner**
2. **Familiarize the students with suitable tools of statistical analysis to handle issues and problems in Statistics and related sciences.**
3. **Know when there is a need for information, to be able to identify, locate, evaluate, and effectively use that information for the issue or problem at hand.**
4. **Understand, formulate, develop arguments logically and use quantitative models to address issues arising in social science, business and other contexts.**
5. **Acquire good knowledge and understanding to solve specific theoretical and applied problems in advanced areas of Statistics.**
6. **Provide students/learners sufficient knowledge and skills enabling them to undertake further studies in Statistics and its allied areas on multiple disciplines linked with Statistics.**
7. **Equip with Statistical modelling ability, problem solving skills, creative talent and powerof communication necessary for various forms of employment**
8. **Develop a range of generic skills helpful in employment, internships& societal activities.**
9. **Get adequate exposure to global and local concerns that provides platform for further exploration into multi-dimensional aspects of Mathematical sciences**

Programme Title	**: B.Sc. Statistics**		
Course Category	**: Core Course – I**		
Course Title	**: DESCRIPTIVE STATISTICS**		
Course Code	**: 25USTCC1**		
Hours/Week	**: 5 hrs**	**Semester**	**:I**
Credit	**: 5**	**Batch**	**: 2025-2028**

Objectives of the Course

1. It explains the important concepts of statistics and statistical data.
2. It provides to formulate the visualization of frequency distribution.
3. Also they measure the averages, dispersions, lack of symmetry, moments, relationship among variables.
4. Estimate and predict the unknown and future values.
5. Study of non-linear and consistency of the data.

Unit – I (Hours: 12)

Statistics: Introduction - Definition – Functions - Applications - Limitations. Organising a Statistical Survey: Planning the survey - Executing the survey-Collection of Data: Primary and secondary data - Methods of collecting primary data - Sources of secondary data. Sampling: Census and Sample methods. Classification-Types - Formation of frequency distribution-Tabulation - parts of a Table - Types. Diagrammatic representation – Types. Graphical representation - Graphs of frequency distributions. Merits and Limitations of diagrams and graphs.

Unit-II (Hours: 12)

Measures of Central tendency: Introduction-Definitions-Types - Mean-Median-Mode-Geometric mean-Harmonic Mean-Weighted mean - Merits and Demerits-Measures of Dispersion: Introduction – Definition – Types – Range - Quartile deviation - Mean deviation - Standard deviation - Co-efficient of variation.

Unit-III (Hours: 12)

Skewness: Introduction-Definition-Types-Karl Pearson's – Bowley's - Kelly's methods – Their merits and demerits. Kurtosis: Introduction-Definition-Types-merits and demerits. Moments: Introduction - Definition-Types - Raw, Central moments and their relations.

Unit-IV (Hours: 12)

Correlation analysis: Introduction - Definition - Types – Ungrouped and Grouped data – Probable error – properties - Rank correlation – Partial and Multiple correlations - Regression analysis: Introduction - Definition – Regression Equations -Multiple regression.

Unit-V(Hours: 12)

Theory of Attributes: Introduction – Definition-Classes and Class frequencies - Consistency of data-Independence of attributes-Association of attributes-Yule's coefficient and -Coefficient of Colligation.

Recommended Text

1. Gupta, S.P. (2017): Statistical Methods, Sultan Chand & Sons Pvt Ltd, New Delhi, 35th Revised Edition.
2. Gupta S.C and Kapoor, V.K. (2002). Fundamentals of Mathematical Statistics, Sultan Chand & Sons Pvt. Ltd., New Delhi

Reference Books

1. Goon A.M. Gupta. A.K. and Das Gupta, B (1987). Fundamental of Statistics, vol.2 World Press Pvt. Ltd., Kolkata
2. G.U. Yule and M.G. Kendall (1956). An Introduction to the theory of Statistics, Charles Griffin.
3. M.R. Spiegel (1961). Theory and problems of Statistics, Schaum's outline series.
4. Anderson, T.W. and Sclove SL. (1978). An introduction to statistical analysis of data, Houghton Miffin&co.
5. Pillai, R.S., and Bagavathi (2003): Statistics, S. Chand and Company Ltd., New Delhi.

Website and e-Learning Source

e-books, tutorials on MOOC/SWAYAM courses on the subject

https://en.wikipedia.org/wiki/Statistics
https://en.wikipedia.org/wiki/Descriptive_statistics
https://socialresearchmethods.net/kb/statdesc.php
http://onlinestatbook.com/2/introduction/descriptive.html

Skills acquired from this Course

Knowledge, Problem Solving, Analytical ability, ProfessionalCompetency, Professional Communication and Transferrable Skill

Course Outcomes (CO):

Students will be able to

CO-1: Describe the scope, functions, applications and limitations of Statistics.

CO-2: Also to explain the statistical survey, collection of data, sampling and presentation of data.

CO-3: Discuss the importance and uses of central values and dispersions for the various types ofdata.

CO-4: Also to measure the various measures of averages and scatteredness of the mass of data ina series.

CO-5: Explain about the lack of symmetry, r^{th} moments and peakedness of the frequency distributions.

CO-6: Ability to apply in data

Mapping of Cos with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	M	M	M	S	M	S	M
CO2	S	S	S	S	M	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S
CO4	M	S	S	S	S	S	S	S	M
CO5	S	S	S	S	M	S	S	S	M
CO6	S	S	S	S	M	S	S	S	M

Programme Title : B.Sc. Statistics
Course Category : Core Course – II
Course Title : PROBABILITY THEORY
Course Code : 25USTCC2
Hours/Week : 4 hrs Semester I
Credit : 5 Batch : 2025-2028

Objectives of the Course

1. It provides the study of random variable, distribution function, mathematical expectation,
2. To describe the importance and scope of probability theory and to predict the chances of an experimental outcomes.
3. Two-dimentional variables and its distributions

Unit-I (Hours: 12)

Theory of Probability: Introduction-Basic terminology- Definition - Axiomatic approach – Types of Events - Conditional Probability - Addition and Multiplication theorems of Probability for 'two' and 'n' events (Statement and Proof) - Boole's inequality (Statement and Proof)- Bayes' theorem of Probability (Statement and Proof with numerical illustration -very simple problems)

Unit-II(Hours: 12)

Random variables and Distribution functions: Introduction - Discrete random variable: Probability mass function- Discrete distribution function, Properties. Continuous random variable : Probability density function and properties, measures of central tendency, dispersion, Skewness and kurtosis for continuous Probability distribution.

Unit-III(Hours: 12)

Two dimensional random variables - Joint probability mass function- Marginal probability function, Conditional probability function. Two dimensional distribution functions-Marginal distribution functions - Joint density function-Marginal density function - Conditional distribution function - Conditional probability density function. Transformation of One - Dimensional and Two Dimensional random variable (concept only).

Unit-IV(Hours: 12)

Mathematical Expectations: Introduction- Expected value of a random variable (Discrete and Continuous)-Expected value of function of a random variable - Properties of Expectation-Properties of variance- Covariance. Inequalities involving expectation: Cauchy Schwartz and Markov inequalities.

Unit-V(Hours: 12)

Generating functions: M.G.F-Properties-Uniqueness theorem - C.G.F-Properties- P.G.F-Properties. Characteristic Function: Properties–Inversion theorems (Statement only)- Uniqueness theorem (Statement only). Chebychev's Inequality (Statement and Proof). Law of Large Numbers (L.L.N): Convergence in probability - Properties: Weak L.L.N - properties-Bernoulli's L.L.N (Statement and Proof) - Khinchin's theorems (Statement only).

Recommended Texts	1.Gupta S.C. and Kapoor V.K (2015): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.
Reference Books	1. Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics. 2. Hogg. R.V. and Craig. A.T. (1978) : Introduction to Mathematical Statistics, McGraw Hill Publishing Co. Inc. New York. 3. Mood A.M. Graybill, F.A. and Bose. D.C. (1974): Introductionto the theory of Statistics, McGraw Hill Publishing Co. Inc. New York. 4.Sanjay Arora and Bansilal (1989): New Mathematical Statistics, Satyaprakashan, New Delhi.
Website and e-Learning Source	e-books, tutorials on MOOC/SWAYAM courses on the subject www.khanacademy.org/math/statistics-probability/random-variables-stats-library https://ocw.mit.edu/courses/mathematics/18-440-probability-and-random-variables-spring-2014/
Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Course Outcomes (CO):

Students will be able to

CO1: Understand concepts of probability and Identify the different approaches of probability theory

CO2: Define the random variable and its respective probability values and to compare a discrete and continuous random variable.

CO3: Calculate the expected value of a random variable variance, covariance, moments and findthe conditional expectation and variance of bi-variate random variable.

CO4: Estimate the measures of central values, Dispersions, Skewness and Kurtosis through the generating function

CO5: Understand bivariate random variables and its distributions

CO6: Application of probability theory in real life

Mapping of Cos with PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CO1	S	S	M	M	M	S	M	S	M
CO2	S	S	S	S	M	S	M	S	M
CO3	S	S	S	M	S	S	M	S	S
CO4	S	S	S	M	S	S	S	S	M
CO5	S	S	S	S	M	S	S	S	M
CO6	S	S	S	S	M	S	S	S	M

<table>
<tr><td colspan="2">Title of the Course</td><td colspan="7">THEORY OF EQUATIONS AND DIFFERENTIAL CALCULUS
(I B.Sc. Statistics)</td></tr>
<tr><td colspan="2">Course No.</td><td colspan="7">Elective – I (GE)</td></tr>
<tr><td rowspan="2">Category</td><td rowspan="2">ELECTIVE COURSE</td><td>Year</td><td>I</td><td rowspan="2">Credits</td><td rowspan="2">3</td><td rowspan="2">Course Code</td><td rowspan="2">25USTMGEC1</td></tr>
<tr><td>Semester</td><td>I</td></tr>
<tr><td colspan="2" rowspan="2">Instructional Hours per week</td><td>Lecture</td><td colspan="2">Tutorial</td><td colspan="2">Lab Practice</td><td>Total</td></tr>
<tr><td>5</td><td colspan="2">-</td><td colspan="2">-</td><td>5</td></tr>
<tr><td colspan="2">prerequisite</td><td colspan="7">12th standard mathematics</td></tr>
<tr><td colspan="2">Objectives of the Course</td><td colspan="7">1. To acquire knowledge in a theory of equations, Differential calculus, and Differential equations.
2. To understand the method of solving algebraic equations using the transformation of equations.
3. To promote problem-solving ability in differential equations.</td></tr>
<tr><td colspan="9">Course Outcomes:
Students will be able to
CO1: learn the concepts of theory of equations, differential calculus, ordinary and partial differential equations
CO2: analyze various methods to find roots of polynomial equations and inspect Horner’s method and Newton’s method to find approximate real roots
CO3: understand the concept of the angle between the radius vector and the tangent, radius of curvature, pedal equation, and Descartes rule of signs and solve related problems
CO4: solve specific types of ordinary and partial differential equations.
CO5: analyze the method of Variation of parameters to solve ordinary differential equations, Lagrange’s method to solve partial differential equations</td></tr>
<tr><td colspan="2">Course Outline</td><td colspan="7">Unit - I
Theory of Equations (15 Hours)
Relation between the roots and coefficients of an equation, Imaginary and irrational roots, Symmetric functions of the roots of an equation in terms of its coefficients (up to cubic equations), and Reciprocal equation.
Chapter 6 (Page No: 6.2 - 6.37)</td></tr>
<tr><td colspan="2"></td><td colspan="7">Unit – II (15 Hours)
Transformation of equation (Definition only), Multiplication of roots by m (Definition only), Diminishing the roots of an equation, Removal of a term, Descartes’ rule of sign, Descartes’s rule of signs for negative roots of an equation, Horner’s method, Newton’s method of evaluating a real root correct to given decimal places.
Chapter 6 (Page No: 6.38 - 6.67)</td></tr>
<tr><td colspan="2"></td><td colspan="7">Unit – III
Differential Calculus (15 Hours)
The angle between the radius vector and the tangent, Angle of the intersection of two curves, the Length of a perpendicular from the pole to the Tangent, Pedal equation, The Cartesian formula for the radius of curvature, and the Parametric formula for the radius of curvature.
Chapter 10 & 11(Page No: 10.1 - 10.23, 11.1 - 11.22)</td></tr>
<tr><td colspan="2"></td><td colspan="7">Unit – IV (15 Hours)

Ordinary Differential Equations</td></tr>
</table>

	Second order differential equations with constant coefficients, finding particular integral for the function $f(x)e^{ax}$, cosax, sin ax, sinhax, coshax, x^m, $e^{ax}v$ where v is any function of x, Linear homogeneous equation and Variation of parameter. **Chapter 23 & 24 (Page No: 23.1 - 23.32, 24.1 - 24.23)**
	Unit – V (15 Hours) **Partial Differential Equations** Elimination of arbitrary constants, Elimination of arbitrary functions, Definitions - complete solution, singular solutions, General solutions, Standard types, Lagrange's linear partial differential equations (Charpit's method to be excluded). **Chapter 26 (Page No: 26.1 - 26.40, 26.44 - 26.58)**
Skills acquired from the course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	P.R. Vittal - Allied Mathematics**,** Margham Publications, Chennai-17
Reference Books	T.K.Manicavachagam Pillai, Natarajan& K.S. Ganapathy - Algebra Volume-I, Viswanathan Publishers, Pvt. Ltd, 2004.
Web resources	1. http://www.universityofcalicut.info/SDE/VI%20Sem.%20B.Sc%20Maths%20-%20Additional%20Course%20in%20lie%20of%20Project%20-Theory%20of%20equations%20&%20fuzzy%20set.pdf 2. https://sol.du.ac.in/pluginfile.php/4111/mod_resource/content/1/B.A.%20st%20m%204_1-7_.pdf

Programme Title : B.A/B.SC/B.Com
Course Category : Skill Enhancement Course (NME – I)
Course Title :: BASICS OF STATISTICS
Course Code : 25USTSEC1
Hours/Week : 2 hrs Semester I
Credit : 2 Batch : 2025-2028

Objectives of the Course:

1. To introduce the basic concepts of Statistics
2. To make them to apply real time data
3. To learn statistical techniques for data analysis

Note: Derivations are not included Questions – Only on the topics mentioned.

Unit – I **No of hours: 6 hrs**
Introduction to Statistics, Functions and Applications of Statistics.
Volume 1 – Chapter 1 (Page No. 1-18)

Unit – II **No of hours: 6 hrs**
Types of data, Collection of data, Presentation of data, Tabulation and Classification of data
Volume 1 – Chapter 3 (Page No. 39-44), Volume 1 – Chapter 5 (Page No. 91-95)

Unit – III **No of hours: 6 hrs**
Diagrammatic and Graphical Representation of data, Types of Diagrams
Volume 1 – Chapter 6 (Page No. 130-154)

Unit – IV **No of hours: 6 hrs**
Measures of Central tendency – Definition and its characteristics – Mean, Median, Mode- (Individual and Discrete series only) Simple problems.
Volume 1 – Chapter 7 (Page No. 180-213)

Unit – V **No of hours: 6 hrs**
Correlation – Definition, its types and uses co-efficient of correlation for ungrouped data only – Rank correlation co-efficient (No repeated ranks) – Simple problems
Volume 1 – Chapter 10 (Page No. 378-381), Volume 1 – Chapter 10 (Page No. 386-388, 406-407)

BOOKS FOR STUDY

S.P. Gupta : Statistical Methods 37th Edition, Sultan Chand & Sons Publications.

BOOKS FOR REFERENCE
1.B.L.Agarwal : Programmed Statistics.
2.R.S.N. Pillai and Bagavatti : Statistics.
3.P.R. Vital: Business Statistics.

Course Outcomes (CO)

Students will be able to

1. **apply** various statistical techniques related data
2. **identify** the data and present it precisely
3. **organize** and **summarize** the data using descriptive statistics
4. **predict** the relevant relationship between various variables

Programme Title : B.Sc. Statistics
Course Category : Foundation Course
Course Title : INTRODUCTORY STATISTICS
Course Code : 25USTSEFC
Hours/Week : 2 hrs Semester I
Credit : 2 Batch : 2025-2028

Course Objective:

1. To introduce the basic concepts of Statistics
2. To make them to apply real time data
3. To learn statistical techniques for data analysis

Note: Derivations are not included Questions – Only on the topics mentioned.

Unit – I **No of hours: 6 hrs**
Introduction to Statistics, Growth of Statistics, Functions and Applications of Statistics, Limitations of Statistics.

Unit – II **No of hours: 6 hrs**
Types of data, Methods of Collecting data, Presentation of data, Meaning and objectives of Classification, Tabulation of data

Unit – III **No of hours: 6 hrs**
Diagrammatic and Graphical Representation of data, Types of Diagrams

Unit – IV **No of hours: 6 hrs**
Measures of Central tendency – Definition and its characteristics – Mean, Median, Mode- (Individual and Discrete series only) Simple problems.

Unit – V **No of hours: 6 hrs**
Correlation – Definition, its types and uses co-efficient of correlation for ungrouped data only – Rank correlation co-efficient (No repeated ranks) – Simple problems

BOOKS FOR STUDY

1.S.P. Gupta : Statistical Methods 37th Edition, Sultan Chand & Sons Publications

BOOKS FOR REFERENCE

1. **NCERT class XI and XII text books.**
2. **Any State board Statistics text books of class XI and XII**

Course Outcomes (CO) :

Students will be able to

1. **apply** various statistical techniques related data
2. **identify** the data and present it precisely
3. **organize** and **summarize** the data using descriptive statistics
4. **predict** the relevant relationship between various variables

Programme Title	**: B.Sc. Statistics**		
Course Category	**: Core** Course – III		
Course Title	**: Matrix and Linear Algebra**		
Course Code	**: 25USTCC3**		
Hours/Week	**: 5 hrs**	**Semester**	**: II**
Credit	**: 4**	**Batch**	**: 2025-2028**

Objectives of the Course

1. *To study the basic operations of transpose and inverse of matrices*
2. *To know the structure of orthogonal and unitary matrices*
3. *To learn the invariance properties of ranks*
4. *To know and to apply the concepts of vector space and matrix polynomials.*

Unit I Matrices-Transpose-Conjugate transpose- Reversal law for the transpose and conjugate transpose. Adjoint of a matrix, Inverse of a matrix, Singular and Non -Singular matrices,

Unit II Reversal law for the inverse of product of two matrices. Commutativity of inverse and transpose of matrix, Commutativity of inverse and conjugate transpose of matrix, Orthogonal and Unitary Matrices, Product of unitary matrices, Partitioning of matrices.

Unit III Rank of a matrix, Echelon form, Rank of transpose, Elementary transformations, Elementary matrices, Invariance of rank through elementary transformations, Reduction to Normal form, Equivalent matrices.

Unit-IV Vector space – Linear Dependence - Basis of a vector space –Sub-space - Properties of Linearly Independent and Dependent systems, Row and Column spaces, Equality of Row and Column ranks, Rank of Sum and Product of matrices

Unit-V Matrix polynomials, Characteristic roots and vectors, Relation between characteristic roots and characteristic vectors, Algebraic and Geometric multiplicity, Nature of characteristic roots in case of special matrices, Cayley- Hamilton theorem.

Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommended Text	1. Vasishtha.A.R (1972): Matrices, KrishnaprakashanMandir, Meerut.
Reference Books	1. Shanthinarayan, (2012) : A Text Book of Matrices, S.Chand& Co, New Delhi 2. M.L.Khanna (2009), Matrices, Jai PrakashNath& Co

Website and e-Learning Source	e-books, tutorials on MOOC/SWAYAM courses on the subject https://samples.jbpub.com/9781556229114/chapter7.pdf https://www.vedantu.com/maths/matrix-rank https://textbooks.math.gatech.edu/ila/characteristic-polynomial.html https://www.aitude.com/explain-echelon-form-of-a-matrix/

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO-1 Do basic operations of matrices
CLO-2 Understand various transactions of matrices and its applications
CLO-3 Understand various properties of matrices
CLO-4 Able to understand vector space and its applications
CLO-5 Able understand eigen vector and its applications
CLO-6 Able understand vector and matrix applications

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CLO1	S	S	M	M	M	S	M	S	M
CLO2	S	S	S	S	M	S	M	S	M
CLO3	S	S	S	M	S	M	M	S	S
CLO4	S	S	S	M	S	S	S	S	M
CLO5	S	S	M	M	M	S	S	S	M
CLO6	S	S	M	S	M	S	S	M	M

CLO-PSO Mapping (Course Articulation Matrix) S-Strong, M-Medium, W-Weak

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Programme Title	**: B.Sc. Statistics**		
Course Category	**: Core Course – IV**		
Course Title	**: Distribution Theory**		
Course Code	**: 25USTCC4**		
Hours/Week	**: 4 hrs**	**Semester**	**: II**
Credit	**:4**	**Batch**	**: 2025-2028**

Objectives of the Course

1. To learn discrete distributions
2. To learn continuous distributions
3. To understand Distributions generated from mathematical functions
4. To learn normal distribution and its properties
5. To understand about sampling distributions

Unit I

Binomial distribution – moments, recurrence relation, mean deviation, mode, moment generating function, characteristic function, cumulants. Fitting of Binomial Distribution. Poisson distribution – moments, mode, recurrence relation, moment generating function, characteristic function, cumulants. Fitting of Poisson distribution. Negative binomial distribution – m.g.f., cumulants. Fitting of Negative binomial distribution.

Unit II

Geometric distribution – lack of memory, moments, m.g.f.- Hypergeometric distribution – mean, variance, approximation to Binomial, recurrence relation – Multinomial distribution – m.g.f., mean and variance.

Unit III

Normal Distribution – chief characteristics of the normal distribution and normal probability curve, mean, median, mode, m.g.f. characteristic function, moments, points of inflexion, mean deviation, Area property – Rectangular distribution – moments, m.g.f., characteristic function, mean deviation about mean.

Unit-IV

Exponential distribution – m.g.f., characteristic function, memory less property – Gamma distribution – m.g.f., cumulants and central moments, reproductive property – Beta distribution – First kind and second kind – constants.

Unit-V

Functions of Normal random variables leading to t, Chi-square and F-distributions (derivations, properties and interrelationships).

Skills acquired from this Course	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text

1. Gupta, S.C. Kapoor, V.K. (2007) Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi
2. Goon, A.M. Gupta M.K. and Das Gupta B (1977) An Outline of Statistical Theory, Vol I, 6/e, World Press, Calcutta.
3. Hogg, R.V. and Graig, A.T. (1978) : Introduction to Mathematical Statistics, A/e, Mc.Graw Hill Publishing Co.Inc., New York.

Reference Books

1. Mood, A.D. Graybill, F.A. and Boes, D.C (1974): Introduction to the Theory of Statistics, 3/e, Mc.Graw Hill, New York.

Website and e-Learning Source

e-books, tutorials on MOOC/SWAYAM courses on the subject

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to
CLO-1 identify discrete distributions appeared in real life situations
CLO-2 understand some continuous distributions and its applications
CLO-3 connection between some of the real values mathematical functions and its application in distribution theory
CLO-4 understand normal distribution and its properties
CLO-5 understand sampling distributions and its applications in real life
CLO-6 identify probability models in real data and estimate population parameters

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CLO1	S	S	M	M	M	S	M	S	M
CLO2	S	S	S	S	M	S	M	S	M
CLO3	S	S	S	M	S	M	M	S	M
CLO4	S	S	S	M	S	S	S	M	M
CLO5	S	M	M	M	M	S	S	S	M
CLO6	S	M	M	S	M	S	S	S	M

CLO-PSO Mapping (Course Articulation Matrix) S-Strong, M-Medium, W-Weak

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Title of the Course	**INTEGRAL CALCULUS AND LAPLACE TRANSFORM (I B.Sc STATISTICS)**						
Paper Number	**EC II (GENERIC)**						
Category ELECTIVE	**Year**	**I**	**Credits**	**3**	**CourseCode**	**25USTMGEC2**	
	Semester	**II**					
Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**			
	3	**-**	**-**	3			
Pre-requisite	12th Standard Mathematics						

Objectives of the Course

1.To acquire the knowledge in integral calculus, Fourier series and Laplace transform
2. To understand the method of doing problems using the above concepts.
3. To analysis the different methods of solving differential equations using the Laplace transform

Unit – I (Hours : 9)
Integral Calculus

Multiple Integrals Evaluation of double integrals, Double integral in polar co- ordinates.
Chapter 20(sections20.1-20.17)

Unit – II (Hours : 9)
Triple integrals, Change of order of integration. applications of double and triple integrals to area volume and centroid.
Chapter 20(sections20.18 -20.44)

Unit – III (Hours : 9)
Fourier Series
Definition, Finding Fourier series for a given periodic function with period 2π, Fourier series for odd and even functions.
Chapter 21 (sections 21.1-21.40)

Unit – IV(Hours : 9)
Laplace Transform
Definition, Laplace transform of elementary functions, Linearity property, Shifting property, Change of Scale property, Laplace transform of derivatives.
Chapter 28 (sections 28.1-28.20)

Unit – V(Hours : 9)
Inverse Laplace transform, Solving differential equations using Laplace transform. (Simultaneous equations are to be excluded).
Chapter 28 (sections 28.23-28.57)
(Section 5:Examples1-10 only,Exercise 4:1-26only)

	Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill
Recommende Text	P.R.Vittal,AlliedMathematics,MarghamPublications,Chennai-1

Reference Books	S. Narayanan and T. K. ManicavachagamPillay,Calculus-Volume III, S. Viswanathan(PrintersandPublishers),Pvt.,Ltd,2011.
Web resources	https://nptel.ac.in

Title of the Course	**THEORY OF EQUATIONS AND LAPLACE TRANSFORM USING SAGE MATH- PRACTICAL (I B.ScSTATISTICS)**				
Paper Number	**EC – PRACTICAL**				
Category ELECTIVE	**Year**	**I**	**Credits**	**Course Code**	**25USTMGECQ**
	Semester	**II**			
Instructional Hours per week	**Lecture**	**Tutorial**	**Lab Practice**	**Total**	
	-	-	**2**	2	
Pre-requisite	Basic knowledge in data and representations				
Objectives of the Course	The main objectives of this course are: 1. To work with interpolation and approximation methods in finding roots using Sage Math. 2. To utilize Sage Math to perform symbolic and numerical integration. and Laplace Transforms				

Course outcome

Unit I: Theory of Equations

Problems on Finding the roots of the equations using the SageMath.

(Page No: 140-141)

Unit II: Non-Linear Equations

Numerical Solution: Location of solutions of Algebraic equations and Iterative Approximation Methods using SageMath

(Page No: 263-288)

Unit III: Multiple integral

Available Integration Functions, Multiple Integrals using SageMath

(Page No: 305-317)

Unit IV: Laplace Equations

Solving problems on Laplce transforms using SageMath

(Page No: 225)

Unit V: Inverse Laplace Transforms

Solving problems on Inverse Laplace transformations using SageMath

(Page No: 226)

Skills acquired from the course	Computational Mathematics with SageMath
Web resources	https://archive.nptel.ac.in/courses/111/106/111106149/

Course Title : Basic Statistics (Practical – I)
Course Code : 25USTSECQ3
Hours/Week : 2 hrs
Semester : II
Credit : 2

Course Objective:

The course aims to provide data handling experience using MS- Excel

Basic Statistics (Practical – I)
(Problems from CORE COURSE I, II, III and IV)

1. Measures of Central Tendencies
2. Measures of Dispersion
3. Correlation and Regression Analysis
4. Association of Attributes.
5. Addition Theorem and Booleans Inequalities.
6. Conditional Probability and Multiplication Theorem.
7. Bayes Theorem
8. Matrix Operations
9. Rank of a Matrix
10. Characteristic roots.
11. Fitting of Distribution (Discrete and Continuous Distribution).

Recommended Text:

1. Gupta, S.C. Kapoor, V.K. (2007) Fundamentals of Mathematical Statistics, Sultan Chand and Sons, New Delhi.
2. Vasishtha.A.R (1972) : Matrices, Krishna prakashan Mandir, Meerut.

Course Title : NME – II: Statistics in Ancient India.
Course Code : 25USTSEC2
Hours/Week : 2 hrs
Semester : II
Credit : 2

Course Objective:

The course aims to provide insight about statistics used in ancient India.

Unit – I: Introduction
Statistics: Definition – Importance and its uses – Probability: Definition and basic terminologies – Addition and Multiplication Theorem

Unit – II: Vedic Mathematics
Introduction - Basic Vedic Mathematical formulae- Sutras for Addition, Subtraction, Multiplication and sub- Multiples – Nikhilam method Yavadunam for finding square and cubic
roots.

Unit – III: Statistics in ancient India
Introduction – Probability concepts in Ancient India – Application of Probability in Dice, Vaccines and insurance in Ancient India.

Unit – IV: Statistics in Games
Introduction – Permutation and Combinatorics - Game of Dice in India – Hymn on Dice in Rigveda – Gambling in Mahabharata.

Unit – V: Evolution of Statistics.
Statistics in ancient Period – Moghul Period – Early and Later British Period – Statistics after Independence

Recommended Text:

1. Tirthaji B.K. (1965) Vedic Mathematics, Motilal Banarsidass
2. Raju, C. K , Probability in Ancient India, in Handbook of Philosophy of Statistics (2011)
,Pg. No. 1175-1196.,
3. Vallverdu, Jordi. (2016). Ancient Statistics History in a Nutshell. 10.1007/978-3-662-
48638-2_2.

Programme Title	**: B.Sc Statistics**		
Course Category	**: Core Course**		
Course Title	**:Estimation Theory**		
Course Code	**:25USTCC5**		
Hours/Week	**: 5 hrs**	**Semester**	**:** III
Credit	**:** 5	**Batch**	**: 2025- 2028**

Objectives of the Course:

1. To Emphasize on the Concept of Point Estimation and IntervalEstimation.
2. To learn properties of a good estimator
3. To understand various methods of estimation

Unit I

Point estimation – Estimator – Consistency and Unbiasedness – Efficiency and asymptotic efficiency –Estimators based on sufficient statistics – Neyman Factorization theorem (statement only) – Simple Illustrations

Unit II

Minimum variance unbiased estimators – Cramer – RaoInequality – Rao Blackwell theorem – Simple illustrations

Unit III

Methods of Estimation – Methods of Maximum likelihood and moments – Properties of estimators obtained by these methods – Simple illustrations

Unit-IV

Method of Minimum Chi-Square-Method of Minimum Variance-Methods of moments -Methods of Least squares- Intervalestimation.

Unit-V

Notion of Bayes estimation – concept of prior, posterior and conjugate priors. Simple problems involving quadratic error loss function – Notion of Minimax estimation – Simple illustrations

Skills acquired from thiscourse:

Knowledge, Problem Solving, Analytical ability, ProfessionalCompetency, Professional Communication and Transferrable Skill

Recommended Text:

1. GuptaS.C. and Kapoor V.K. (2007):Fundamentals of Mathematical Statistics, Sultan Chand Sons, New Delhi.
2. P.R. Vittal(2002) : Mathematical Statistics, Margham Publications, Chennai.
3. Ashok K. Bansal (2007): Bayesian Parametric Inference, Narosa Publishing House.
4. Mood, A.M. Graybill, F.A. and Boes D.C. (1974): Introduction to Theory of Statistics, McGraw – Hill.

Books For Reference:

1. Rohatgi, V. (1976): An Introduction to Probability Theory and Mathematical Statistics, Wiley Eastern.
2. Goon A.M. Gupta M.K. and Das B. (1980): An Outline of Statistical Theory, Vol II, World Press, Calcutta
3. Sanjay Arora and Bansi Lal (1989): New Mathematical Statistics, Satya Prakasam, New Delhi.
4. Hodges, J.L. and Lehman, E.L (1964): Basic Concepts of Probability and Statistics, Holden Day.
5. Dr. A. Santhakumaran (2004): Probability Models and their Parametric Estimation

Web resources:

e-books, tutorials on MOOC/SWAYAM courses on the subject

Course Learning Outcome (for Mapping with POs and PSOs)

CLO-1 estimate population parameters
CLO-2 identify good estimators and its properties
CLO-3 derive interval estimators of a parameter
CLO-4 estimate parameters using various estimation methods and identify the best among theestimators
CLO-5 handle data and can estimate population parameters
CLO-6 realize the application of different types of estimators

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CLO1	S	S	M	M	M	S	S	S	M
CLO2	S	S	S	S	M	S	S	S	M
CLO3	S	S	S	M	S	M	S	S	M
CLO4	S	S	S	M	S	S	S	S	M
CLO5	S	S	M	M	M	S	S	S	M
CLO6	S	M	M	S	M	S	S	S	M

CO-PO Mapping (Course Articulation Matrix)

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's S-Strong, M-Medium, W-Weak

Programme Title	**: B.Sc Statistics**		
Course Category	**:Core Course**		
Course Title	**: Sampling Techniques**		
Course Code	**: 25USTCC6**		
Hours/Week	**: 5 hrs**	**Semester**	**:** III
Credit	**:** 5	**Batch**	**: 2025- 2028**

Objectives of the Course:

1. To know the basic operations of sampling
2. To study the theory and applications of SRS
3. To learn practical uses of Stratification
4. To apply Systematic and PPS Sampling in real time problems.

Unit I

Basic concepts of sample surveys – Advantages of Sampling – Principal steps in Sample survey, Sampling unit – Sampling frame –Census – Probability Sampling, Alternatives to probability sampling,Mean Square Error.

Unit II

Simple random sampling, Methods of selection, Sampling with and without replacement – Properties of estimates, Finite population correction, Estimation of Standard error, Confidence limits.

Unit III

Stratified random sampling, principles of stratification, Notations – Estimation of population mean and its variance – Estimated variance and confidence limits, Allocation techniques -equal allocation proportional allocation, Neyman allocation and optimum allocation Estimation of gain due to stratification.

Unit-IV

Systematic sampling –Relation to cluster sampling, Estimation of population mean and its sampling variance – Comparison of systematicsampling with stratified random samples.

Unit-V

Varying Probability sampling, Selection of one unit with PPS, PPS Sampling with replacement, Estimator for population total and itsvariance.

Recommended Text:

1. Cochran, W.G. (1978): Sampling Techniques, John Wiley Eastern
2. Murthy M.N. (1967): Sampling Theory and Methods,Statistical Publishing Society, Calcutta

Books For Reference:

1. Singh. D. and Chaudry F.S. (1986): Theory and Analysis ofSample Surveys Design Wiley Eastern Ltd.
2. Sampath. S, (2001), Sampling Theory and Methods, CRC Press.

Web resources:

e-books, tutorials on MOOC/SWAYAM courses on the subject
http://ocw.jhsph.edu/courses/statmethodsforsamplesurveys/pdfs/lectur e2.pdf
https://www.questionpro.com/blog/stratified-random-sampling/
https://www.scribbr.com/methodology/systematic-sampling/
http://home.iitk.ac.in/~shalab/sampling/chapter7-sampling-varying- probability-sampling.pdf

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO-1 Know the difference between census and sampling.
CLO-2 Understand basic operations and advantages of sampling
CLO-3 Understand widely used sampling techniques
CLO-4 Know to estimate population information using sampling
CLO-5 Apply sampling techniques in real time problems
CLO-6 identify suitable sampling technique for a real life survey

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CLO1	S	S	M	M	M	S	S	S	M
CLO2	S	S	S	S	M	S	S	S	M
CLO3	S	S	S	M	S	M	S	S	M
CLO4	S	S	S	M	S	S	S	S	M
CLO5	S	S	M	M	M	S	S	S	M
CLO6	S	M	M	S	M	S	S	S	M

CO-PO Mapping (Course Articulation Matrix) S-Strong, M-Medium, W-Weak

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Programme Title : B.Sc Statistics
CourseCategory : Discipline Specific Course
Course Title : Numerical Methods
Course Code : 25USTDSEC1
Hours/Week : 4 hrs **Semester : III**
Credit : 3 **Batch : 2025- 2028**

Objectives of this Course :

1. To introduce the study of algorithms that used numerical approximation for the problems of Mathematical analysis.
2. To solve mathematical problems numerically.

Unit I

The Solution of Numerical Algebraic and Transcendental Equations: Iteration method, Bisection Method, Regula Falsi Method, Newton –Raphson Method.

Unit II

Interpolation for Equal intervals:Newton_s Forward Interpolation Formula and Newton_s Backward Interpolation Formula, Evaluation of missing terms.

Unit III

Central Difference Interpolation Formula For Equal Intervals: Gauss Forward Interpolation Formula, Gauss Backward Interpolation Formula, Sterling's Formula. Interpolation with Unequal Intervals: Lagrange_s Interpolation Formula.

Unit-IV

Numerical Differentiation: Numerical Differentiation based on Newton_s Forward and Backward Interpolation Formula – Computation of Second order derivatives.

Unit-V

Numerical Integration: General Quadrature formula for equidistant ordinates, Trapezoidal Rule, Simpson_s 1/3rd Rule, Simpson_s 3/8th Rule and Weddle_s Rule.

Skills a quired from this Course:

Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

Recommended Text:

1. Kandasamy, P., Thilagavathy, K. (2003): Calculus of Finite Differences and Numerical Analysis, S.Chand Publications
2. Balasubramaniam and Venkatraman(1972): Numerical mathematics part I and II by Rochouse and Sons

Books for reference:

1. Kalavathy, S., and Thomson. (2004): Numerical Methods, Vijay Nico::le Publications.
2. Gupta, B.D. (2004): Numerical Analysis, Konark Publications.
3. Venkatachalapathy, S.G. (2004): Calculus of Finite Differences and Numerical Analysis, Margam Publications.

4. Gerald Wheatley, (1970): Applied Numerical Analysis, Pearson Education Publications.
5. Jain, M.K., Iyengar, S.R., Jain, R.K., (1994): Numerical Methods Problems and Solutions, New Age International Publishers.

Website :

e-books, tutorials on MOOC/SWAYAM courses on the subject www.nptel.com

Course Learning Outcome (for Mapping with POs and PSOs)

Students will be able to

CLO-1 Solve numerically equations that cannot have direct solution
CLO-2 solve system of linear equations
CLO-3 understand the need of interpolation
CLO-4 handle numerical differentiation
CLO-5 do integration numerically
CLO-6 get a foundation on algorithms to solve a mathematical problem

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	PSO9
CLO1	S	S	M	M	M	S	S	S	M
CLO2	S	S	S	S	M	S	S	S	M
CLO3	S	S	S	M	S	M	S	S	M
CLO4	S	S	S	M	S	S	S	S	M
CLO5	S	S	M	M	M	S	S	S	M
CLO6	S	M	M	S	M	S	S	S	M

CO-PO Mapping (Course Articulation Matrix) S-Strong, M-Medium, W-Weak

CO /PO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	3	3	3	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3
Weightage	15	15	15	15	15
Weighted percentage of Course Contribution to Pos	3.0	3.0	3.0	3.0	3.0

Level of Correlation between PSO's and CO's

Programme Title : B.Sc. Statistics

Course Category : Skill Enhancement Course

Course Title : Data Analysis Using MS – Excel

Course Code : 25USTSECQ4

Hours/Week : 2 - Semester : III

Credit : 1 Batch : 2025- 2028

Objectives

: 1. To enable the students to gain computer practical knowledge about the concepts of statistiCS

2. To apply the measures of descriptive statistics and probability in real life situations using MS excel

3. To provide practical knowledge in random variables, probability distributions, expectation, moment generating function, matrices, Rank of matrices

Practical Exercises:

1.Computation of Measures of Central Tendency for discrete data using MS Excel (Mean, Median, Mode,
Geometric Mean, Harmonic Mean)

2. Computation of Measures of Central Tendency for Continuous data using MS Excel (Mean, Median, Mode,
Geometric Mean, Harmonic Mean)

3. Computation of Measures of dispersion for discrete data using MS Excel ()

4. Computation of Measures of dispersion for Continuous data using MS Excel ()

5. Graphical Presentation of data (Histogram, Frequency Polygon, Ogives) Using MS Excel.

6. Computation of Co-efficient of Skewness and Kurtosis – Karl Pearson_s and Bowley_s data using MS Excel

7. Fitting of Binomial distribution – Direct Method using MS Excel.

8. Fitting of Poisson distribution – Direct Method using MS Excel.

9. Fitting of Exponential distribution – Direct Method using MS Excel.

10. Problems based on univariate probability distributions.

11. Problems based on probability.

12. Calculating Inverse matrix in Excel.

13. Calculating Transpose matrix in Excel

. 14. Calculating Rank matrix in Excel.

Programme Title	**: B.Sc Statistics**		
Course Category	**: Skill Enhancement Course**		
Course Title	**: Practical: Estimation and Sampling**		
Course Code	**:25USTSECQ5**		
Hours/Week	**: 2 hrs**	**Semester**	**:** III
Credit	**:** 2	**Batch**	**: 2025- 2026**

Objectives of this Course

1. To enable the students to gain practical knowledge of estimation of parameters and its interval.
2. To know the basic operations of sampling
3. To study the theory and applications of SRS
4. To learn practical uses of Stratification
5. To apply Systematic and PPS Sampling in real time problems.

Unit I

Estimation of parameters of statistical model – Multinomial distribution, exponential, binomial and Poisson distribution –Construction of Confidence intervals for mean and variance

Unit II

Method of maximum likelihood and method of moments

Unit III

Simple random Sampling Drawing Sample from the Population with and without Replacement – Estimation of Population Mean, Total Variance and its Standard Error.

Unit IV

Stratified random Sampling Estimation of Mean, Variance of the Population Means – Variance of the estimator of Mean under Proportional and Optimal allocations

Unit V

Systematic random sampling Estimation of Mean and Variance – Comparison of Simple Random Sampling, Stratified Random Sampling and Systematic Random Sampling