

SRI SARADA COLLEGE FOR WOMEN (AUTONOMOUS)

Reaccredited with “B++” Grade by NAAC

(Affiliated to Periyar University)

SALEM – 16



DEPARTMENT OF STATISTICS

CHOICE BASED CREDIT SYSTEM (CBCS)

**LEARNING OUTCOME BASED CURRICULUM FRAMEWORK
(LOCF)**

B.Sc. STATISTICS

2026-2029 BATCH

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INTRODUCTION

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 processes, 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. This syllabus is aimed at preparing the students to cope with the latest developments and compete with students from other universities and put them on the right track. Along with this, students are equipped with skill enhancement courses like Research methodology, Statistical packages and R language.

LEARNING OUTCOMES-BASED CURRICULUM FRAMEWORK GUIDELINES BASED REGULATIONS FOR UNDER GRADUATE PROGRAMME	
Programme:	U.G.
Duration:	3 years [UG]
Programme Outcomes:	PO1: Disciplinary knowledge: Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study PO2: Communication Skills: Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups. PO3: Critical thinking: Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidences; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development. PO4: Problem solving: Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations. PO5: Analytical reasoning: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples and addressing opposing viewpoints. PO6: Research-related skills: A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesizing and articulating; Ability to recognize cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyze, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation PO7: Cooperation/Team work: Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team

	PO8: Scientific reasoning: Ability to analyze, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective. PO9: Reflective thinking: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society. PO10: Information/digital literacy: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data. PO11: Self-directed learning: Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion. PO12: Multicultural competence: Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups. PO13: Moral and ethical awareness/reasoning: Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demonstrating the ability to identify ethical issues related to one's work, avoid unethical behavior such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work. PO14: Leadership readiness/qualities: Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way. PO15: Lifelong learning: Ability to acquire knowledge and skills, including learning how to learn, that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
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Programme Specific Outcomes:	PSO1: Apply fundamental statistical concepts, probability models, and quantitative techniques to collect, organize, analyse, and interpret data for informed decision-making. PSO2: Develop competence in statistical methods for solving problems in diverse fields such as business, economics, health, agriculture, industry, environmental studies, and social sciences. PSO3: Demonstrate proficiency in statistical computing, data visualization, and the use of statistical software and programming tools for data analysis and research. PSO4: Evaluate real-world problems using statistical reasoning, design appropriate analytical methods, and provide evidence-based solutions with professional ethics and social responsibility. PSO5: Enhance analytical, critical thinking, and research skills to interpret statistical results, assess the effectiveness of policies and programmes, and support data-driven decision-making.
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❖ Highlights of the Revamped Curriculum:

- Student-centric, meeting the demands of industry & society, incorporating industrial components, hands-on training, skill enhancement modules, industrial project, project with viva-voce, exposure to entrepreneurial skills, training for competitive examinations, sustaining the quality of the core components and incorporating application-oriented content wherever required.
- The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics, practical training, devising mathematical models and algorithms for providing solutions to industry / real life situations. The curriculum also facilitates peer learning with advanced mathematical topics in the final semester, catering to the needs of stakeholders with research aptitude.
- The curriculum is designed so as to strengthen the Industry-Academia interface and provide more job opportunities for the students.
- The Industrial Statistics course is newly introduced in the fourth semester, to expose the students to real life problems and train the students on designing a mathematical model to provide solutions to the industrial problems.
- The Internship during the second year vacation will help the students gain valuable work experience, that connects classroom knowledge to real world experience and to narrow down and focus on the career path.

- Project with viva-voce component in the fifth semester enables the student, application of conceptual knowledge to practical situations. The state of art technologies in conducting a Explain in a scientific and systematic way and arriving at a precise solution is ensured. Such innovative provisions of the industrial training, project and internships will give students an edge over the counterparts in the job market.
- State-of Art techniques from the streams of multi-disciplinary, cross disciplinary and inter disciplinary nature are incorporated as Elective courses, covering conventional topics to the latest - Artificial Intelligence.

Value additions in the Revamped Curriculum:

Semester	Newly introduced Components	Outcome / Benefits
I	Foundation Course To ease the transition of learning from higher secondary to higher education, providing an overview of the pedagogy of learning Literature and analysing the world through the literary lens gives rise to a new perspective.	➤ Instill confidence among students ➤ Create interest for the subject
I, II, III, IV	Skill Enhancement Course (Discipline centric / Generic / Entrepreneurial)	➤ Industry ready graduates ➤ Skilled human resource ➤ Students are equipped with essential skills to make them employable
III, IV, V & VI	Elective courses	➤ Strengthening the domain knowledge ➤ Introducing the stakeholders to the State-of Art techniques from the streams of multi- disciplinary, cross disciplinary and inter disciplinary nature ➤ Emerging topics in higher education/ industry/ communication network / health sector etc. are introduced with hands-on-training.
IV	Elective courses	➤ Exposure to industry ready students into solution providers ➤ Generates Industry ready graduates ➤ Employment opportunities enhanced
V	Elective Courses	➤ Self-learning is enhanced ➤ Application of the concept to real situation is conceived resulting in tangible outcome

VI	Elective Courses	➤ Enriches the study beyond the course. ➤ Developing a research frame work and presenting their independent and intellectual ideas effectively.
Extra Credits: For Advanced Learners		➤ To cater to the needs of peer learners /research aspirants
Skills acquired from the Courses		Knowledge, Problem Solving, Analytical ability, Professional Competency, Professional Communication and Transferrable Skill

[illegible]

Consolidated Semester wise and Component wise Credit distribution

Parts	Sem I	Sem II	Sem III	Sem IV	Sem V	Sem VI	Total Credits
Part I	3	3	3	3	-	-	12
Part II	3	3	3	3	-	-	12
Part III	12	12	14	13	22	18	91
Part IV	4	5	4	6	4	3	26
Total	22	23	24	25	26	21	141

Part I, II, and Part III components will be separately taken into account for CGPA calculation and classification for the undergraduate programme and the other component. Part IV has to be completed during the duration of the programme as per the norms, to be eligible for obtaining the UG degree.

Total Credits: 141

EXTRA CREDITS FOR EXTRA SKILLS

Total Extra Credits -28 (20% of the total credits)

B.Sc. STATISTICS
CURRICULUM DESIGN AND SCHEME OF EXAMINATION
(APPLICABLE TO STUDENTS ADMITTED DURING THE ACADEMIC
YEAR 2025-26)

SEMESTER-I

Part	Course Code	Course Title	Course Type	Hrs. / Week L/T/P	Credits	CIA	ESE	TOTAL
I	26ULTC1/ 26ULHC1/ 26ULSC1	Tamil/Hindi/ Sanskrit –I	Language	6	3	30	70	100
II	26ULEC1	English – I	English	6	3	30	70	100
III	26USTCC1	Descriptive Statistics	Core Course	5	5	30	70	100
	26USTCC2	Probability Theory	Core Course	4	4	30	70	100
	26USTMGEC1	Theory of Equations and Differential Calculus	Generic Elective	5	3	30	70	100
IV	26USTSEC1	Basics of Statistics	Skill Enhancement Course	2	2	30	70	100
	26USTSEFC	Introductory Statistics	Foundation Course	2	2	30	70	100
Total				30	22			
*Extra Skills (Out of College Hours)						*Credits	*Marks	
Articulation and Idea Fixation						-	-	
Physical Fitness Practice						-	-	
Society Connect Activity						-	-	

***Extra credits are given for extra skills and courses qualified in MOOC / NPTEL**

PEDAGOGICAL APPROACHES

TEACHING LEARNING STRATEGIES

- a) Chalk and talk
- b) Group -Learning and Teaching
- c) Individual Learning /Self-Study
- d) Game Based Learning
- e) Technology Based Learning
- f) Peer Teaching
- g) Learning Through Problem solving
- h) Project Based Learning

METHODS OF EVALUATION AND ASSESSMENT

Methods of Evaluation-Theory		
Internal Evaluation	Continuous Internal Assessment Test	30 Marks
	Assessment Components	
	Model Examination and Attendance	
External Evaluation	End Semester Examination	70 Marks
	Total	100 Marks
Methods of Evaluation-Practical		
Internal Evaluation	Laboratory work assessment (best 2 out of 3)	40 Marks
	Viva voce/ Lab quiz, Class Performance	
External Evaluation	End Semester Examination	60 Marks
	Record	
	Total	100 Marks
REVISED BLOOMS LEVEL		
BL1	Exhibits memory of previously learned material by recalling fundamental facts, terms, basic concept and answers about the selection.	
BL2	Demonstrate understanding of parts and Idea free organizing, comparing, translating, interpreting, giving descriptors and stating main ideas.	
BL3	Solve problems in new situation by applying acquired knowledge, facts, techniques and rules in different or new way.	
BL4	Examine and break information into parts by identifying motives or causes. Make inference and find evidence to support generalizations.	
BL5	Present and depend opinion by making judgement about information, validity of ideas or quality of work based on a set of criteria.	
BL6	Compile information together into different way by combining elements in a new pattern or proposing alternative solutions.	

Evaluation Pattern

An academic year is divided into two semesters. The first semester is from June/July to November/December and the second semester is from November/December to April/May. A semester consists of 90 working days.

Evaluation consists of both Continuous Internal Assessment (CIA) and End Semester Examinations (ESE). The entire Undergraduate and Postgraduate Programmes offered by our college have various assessments for continuous internal evaluation. Relevant types of internal assessment are developed suiting the needs and requirements of each specific course. The various assessment components are quiz, snap test, viva-voce, seminar, listening comprehension, reading comprehension, problem solving, map reading, group discussion, panel discussion, assignment, field visit, poster presentation, open book test, writing composition, case study, online test, Book Review, Projects etc.

The CIA marks are read out and signed by the students in the respective classes on the day specified in the calendar. CIA is mandatory for all the students.

Internal Assessment Modes (Theory Course)

Any six of the assessment components	15 marks
Cycle Test(2)	5 marks
Model Examination	5 marks
Attendance	5 marks
Total	30 marks

Internal Assessment Modes (Practical Course)

Laboratory work assessment (best 2 out of 3)	20 marks
Viva voce/ Lab quiz	10 marks
Class Performance	10 marks
Total	40 marks

Society Connect Project (UG & PG)

Project Assessment	10 marks
Presentation and feedback from the society	10 marks
Participation in discussion	10 marks
Total	30 marks

Internal Assessment Modes (Project)

Project Assessment	15 marks
Participation in discussion	10 marks
Presentation	5 marks
Total	30 marks

PASSING MINIMUM

The candidate shall be declared to have passed the examination if the candidates secure not less than 28 marks out of 70 marks in the semester examination in each theory course and in total (CIA mark + Theory ESE) not less than 40 marks.

The candidates shall be declared to have passed the examination if she secures not less than 40 marks in total (CIA mark + Practical Exam mark) with minimum of 25 marks out of 60 marks in the Practical Exam conducted by the University. There is no passing minimum for the record notebook. However, submission of the record notebook is necessary. Candidate who does not obtain the required minimum marks for a pass in a Course/Practical shall be declared Re-Appear (RA) and the candidate has to appear and pass the same at a subsequent appearance.

Theory Course (Revised Bloom's Taxonomy)

Question Paper Model for UG

Intended Learning Skills	Maximum 70 marks Passing Minimum :40% Duration: Three hours
Memory Recall/ Example/ Counter Example/Knowledge about the Concept/ Understanding	Part- A ($20 \times 1 = 20$ marks) Answer ALL questions Each question carries 1 marks
	Four questions from each UNIT
	Questions 1 to Questions 20
Description/Application (problem)	Part- B ($5 \times 4 = 20$ marks) Answer ALL questions Each question carries 4 marks
	Either-or-Type Both parts of each question from the same Unit
	Questions 21(a) or 21 (b) to Questions 25(a) to 25(b)
Analysis/ Create/Evaluation	Part- C ($3 \times 10 = 30$ marks) Answer ANY THREE questions Each question carries 10 marks
	There shall be FIVE questions covering all the five units
	Question 26 to Question 30

Each question should carry course outcomes and cognitive level

For instance:

1. [CO1 : BL₂] Question xxxx
2. [CO3 : BL₁] Question xxxx

SEMETER WISE INDEX

Semester	Course	Course Code	Page No.
I	Descriptive Statistics	25USTCC1	21
I	Probability Theory	25USTCC2	23
I	Algebra and Differential Calculus	25USTMGEC1	25
I	Basics of Statistics	25USTSEC1	27
I	Introductory Statistics	25USTSEFC	29

Programme Title	: B.Sc. Statistics		
Course Category	: Core Course – I		
Course Title	: DESCRIPTIVE STATISTICS		
Course Code	: 26USTCC1		
Hours/Week	: 5 hrs	Semester	:I
Credit	: 5	Batch	: 2026-2029

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 – Lorenz Curve - Merits and Demerits.

Unit – III (Hours: 12)

Skewness: Introduction - Definition - Types - Karl Pearson's, Bowley's and Kelly's Methods – Their Merits and Demerits.

Kurtosis: Introduction - Definition - Types - Its Merits and Demerits.

Moments: Introduction - Definition - Types - Raw and 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 - Principle of Least Squares for First Degree, Second Degree, Exponential and Power Curves.

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.

Applications of Artificial Intelligence in Statistics: Preparation of Questionnaires using AI Tools, Data Collection and Data Cleaning using AI, Basic Statistical Analysis and Interpretation using AI Tools, AI-assisted Generation of Tables, Graphs and Statistical Reports.

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 Mifflin&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, Professional Competency, Professional Communication and Transferrable Skill

Course Outcomes (CO):

Students will be able to

CO1: Understand the basic concepts of statistics, data collection, classification, tabulation, and data presentation.

CO2: Calculate measures of central tendency and dispersion for statistical data.

CO3: Explain the concepts of skewness, kurtosis, and moments.

CO4: Apply correlation and regression techniques to analyze the relationship between variables.

CO5: Apply AI tools for data collection, statistical analysis, data visualization, and report preparation.

Mapping of Cos with PSOs

COs / PSOs	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	M	M	S
CO2	S	M	S	M	S
CO3	M	M	S	M	S
CO4	S	M	S	S	S
CO5	M	M	S	M	S

Programme Title	: B.Sc. Statistics		
Course Category	: Core Course – II		
Course Title	: PROBABILITY THEORY		
Course Code	: 26USTCC2		
Hours/Week	: 4 hrs	Semester	I
Credit	: 5	Batch	: 2026-2029

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-dimensional 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.

Applications of Artificial Intelligence in Probability: AI-assisted probability calculations, simulations, and visualization of probability distributions

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): Introduction to 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:

Students will be able to

CO1: Understand the basic concepts of probability and solve simple probability problems.

CO2: Understand random variables and probability distributions.

CO3: Apply joint, marginal, and conditional distributions to solve simple problems.

CO4: Calculate expectation, variance, and covariance, and apply AI tools for probability analysis.

CO5: Understand generating functions and the law of large numbers.

Mapping of Cos with PSOs

CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	M	S	W	M
CO2	M	S	S	W	M
CO3	S	S	S	M	S
CO4	S	S	M	S	S
CO5	M	M	S	W	S

Title of the Course		THEORY OF EQUATIONS AND DIFFERENTIAL CALCULUS (I B.Sc. Statistics)					
Course No.		Elective - I (GE)					
Category	ELECTIVE COURSE	Year	I	Credits	3	Course Code	26USTMGEC1
		Semester	I				
Instructional Hours per week		Lecture	Tutorial	Lab Practice		Total	
		5	-	-		5	
Prerequisite		12 th Standard Mathematics					
Objectives of the Course		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.					
Course Outcomes: Students will be able to CO1: Identify the relation between roots and coefficients, imaginary and irrational roots, symmetric functions, and reciprocal equations to analyze polynomial equations and evaluate algebraic solutions. CO2: Explain equation transformations, Descartes' rule of signs, Horner's method and Newton's method to apply numerical techniques and assess polynomial roots. CO3: Describe tangents, pedal equations, angle of intersection and radius of curvature to examine plane curves and justify geometrical properties. CO4: Interpret second-order differential equations, particular integrals, linear homogeneous equations and variation of parameters to apply analytical methods and validate mathematical solutions. CO5: Discuss partial differential equations, complete, singular and general solutions, standard types and Lagrange's linear equations to analyze solution methods and evaluate mathematical results.							
Course Outline		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)					
		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)					
		Unit - III 15 Hours					
		Differential Calculus 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)					

	Unit – IV 15 Hours Ordinary Differential Equations Second order differential equations with constant coefficients, finding particular integral for the function $f(x)e^{ax}$, $\cos ax$, $\sin ax$, $\sinh ax$, $\cosh ax$, 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	: 26USTSEC1		
Hours/Week	: 2 hrs	Semester	I
Credit	: 2	Batch	: 2026-2029

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	: Foundadtion Course		
Course Title	: INTRODUCTORY STATISTICS		
Course Code	: 26USTSEFC		
Hours/Week	: 2 hrs	Semester	I
Credit	: 2	Batch	: 2026-2029

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