

GUJARAT UNIVERSITY
B. COM. (HONS)
SEMESTER –II
PROBABILITY THEORY (MAJOR)
COURSE CODE: DSC-C STA 121
CREDIT MARK DISTRIBUTION – 04
AS PER NEP 2020 (To be effective from June 2023)

Lecture 04 Hours
Tutorial – 00
Practicum – 00

1. Course Code & Title

Course Title : Bachelor of Commerce	
Course Code : DSC-C STA 121	No. of Credits : 04

2. Course Overview & Course Objectives

<p>Course Overview/ Course Description</p> <p>This course offers students the knowledge about basics of methods of probability. This knowledge is necessary for the students who are opting statistics subject and for the professional and advanced studies this course will be very advantageous.</p>
<p>Course Objectives</p> <ol style="list-style-type: none"> 1. To make them familiar with the basics of the probability theory. 2. To give basic knowledge of tool requires for analyzing the probability distributions. 3. To make them aware of importance of probability mass functions. 4. To make students familiar with various types of distribution functions and their applications.

3. Course Content

Unit	Topics	Content/ Fundamental Concepts	Unit Wise SLO
1.	Probability Theory	<p>A. IKS Definition of Factorial (Patiganita of Sridhar). The theory of Permutations and Combinations. (433-357 BCE by Bhadrabahu). The Game of Dice. Gambling in Mahabharat.</p> <p>B. Introduction and definition of random experiment, sample space, different types of events, Mathematical, statistical and axiomatic definitions of probability with their limitations,</p>	Appreciative approach to measure uncertainty or randomness in the occurrence of any event and to use it for the problems of real life problems.

		Types of probability - classical, relative, subjective- , Addition and multiplication rules of probability and other corollaries of it, conditional probability, numerical examples based on all these concepts, Bayes' theorem (without proof) and its application up to three events and simple numerical examples based on it.	
2.	Mathematical Expectation and Moments:	Meaning and definition of random variable and its type, Definition of probability distribution of random variable, Definition of mathematical expectation of discrete random variable and its properties (without proof), Simple applied examples on mathematical expectation Definition of variance, covariance and its properties. Simple examples based on it. Meaning and definition of Raw and Central moment and its uses Relation between first four raw and central moments (without proof), Concept of coefficient of Skewness and Kurtosis and their interpretations, Simple examples for obtaining the measures by using raw data, grouped data and probability distribution.	Extending the knowledge of probability, to have statistical analysis when probabilities or probability distribution function of random variable is known.
3.	Discrete Probability Distributions -1	Meaning and definition of probability distributions and distribution function of random variable, Probability mass function of Binomial distribution, its properties and applications, application base numerical examples. Probability mass function of Poisson distribution, properties, applications and simple application base examples. (Mathematical proofs are ignored in all distribution).	For determining probability in the case of dichotomous outcomes and for the rare events such distributions are used to find probability.
4.	Discrete Probability Distributions -2	Meaning and definition of probability mass function of Hyper-geometric distribution, properties, its comparison with Binomial distribution and simple applications based numeric examples on it. Meaning and definition of Probability mass function of Negative Binomial distribution Its properties and applications, Numerical examples.	For determining probability in easy and simple manner, familiarity with various types of distributions is to be studied.

		Meaning and definition of probability mass function of Geometric distribution, simple applications and their properties and simple examples based on application. (Mathematical proofs are ignored in all distribution).	
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4. Course Learning Outcomes/Students' Learning Outcomes (SLO)

Course Learning Outcomes
<ol style="list-style-type: none"> 1. This course helps to measure uncertainty or randomness in the occurrence of any event and to use it for the problems of real life problems. 2. This course gives idea of the statistical analysis when probabilities or probability distribution function of random variable is known. 3. Learning to determining probability in the case of dichotomous outcomes and for the rare events such distributions are used to find probability. 4. Attaining knowledge of determining probability in easy and simple manner, familiarity with various types of distributions are to be studied.

5. MODE OF EVALUATION

Evaluation will be divided in two parts:

- **Semester End Evaluation (SEE):** Semester End Examination will be conducted by the Gujarat University of 50 Marks
- **Continuous and Comprehensive Evaluation (CCE):** Continuous and Comprehensive Evaluation of 50 marks will be decided by the colleges / Institutes/ University departments as per the instruction given by the University time to time

6. Recommended learning Resources

- Levin and Rubin: "Statistics for Management", Prentice Hall of India Pvt. Ltd. New Delhi
- Sancheti & Kapoor: Business Statistics. Sultan Chand & Sons, New Delhi
- Sancheti & Kapoor: Business Mathematics, Sultan Chand Sons, New Delhi..
- S. C. Gupta, V. K. Kapoor, Fundamentals of Applied Statistics, Sultan Chand & sons, New Delhi.
- S.C. Gupta: "Fundamentals of Mathematica Statistics" S. Chand, New Delhi.

GUJARAT UNIVERSITY
B. COM. (HONS)
SEMESTER –II (MAJOR)
MATHEMATICAL STATISTICS- I
COURSE CODE: DSC-C STA 122
CREDIT MARK DISTRIBUTION – 04
AS PER NEP 2020 (To be effective from June 2023)

Lecture 04 Hours
Tutorial – 00
Practicum – 00

1. Course Code & Title

Course Title : Bachelor of Commerce	
Course Code : DSC-C STA 122	No. of Credits : 04

2. Course Overview & Course Objectives

<p>Course Overview/ Course Description This course offers students the knowledge about basic mathematical techniques. This knowledge is necessary for the commerce students. This knowledge they can also apply and verify in other subjects like economics, management, etc. and for the professional and higher studies this course is must.</p>
<p>Course Objectives</p> <ol style="list-style-type: none"> 1. To understand the basic knowledge of the current business and industrial environment and to get acquainted for its translation in to mathematical form. 2. To give basic knowledge of techniques of calculus. 3. To make them aware of importance of applied mathematical methods 4. To make students familiar with relation between formulation and solution of problem.

3. Course Content

Unit	Topics	Content/ Fundamental Concepts	Unit Wise SLO
1.	Function, Limit and Continuity	<p>A. IKS What is Calculus? History of Calculus. Indian contribution to Calculus.</p> <p>B. Concept of a function of single variable (linear, quadratic and exponential function only) Domain, co-domain and range of a function, Concept of real function, Application of function to cost, demand, revenue, profit function, break-even point,</p>	<p>Understanding formulation of real life problems and convert it in to functional form and solving them. Also to learn basic concept of limit and continuity.</p>

		<p>Concept and definition of limit of a function, meaning of $x \rightarrow 0$, $x \rightarrow a$, $x \rightarrow \infty$. Limit of a function by using tabular method. Basic rules of limit, Simple examples on it and examples where $f(x)$ is in a polynomial or rational function of two polynomials.</p> <p>Meaning and definition of Continuity of $f(x)$, where $f(x)$ is a polynomial of x, rational function of 'two polynomials of x.</p>	
2.	Differentiation	<p>Definition of a differentiation, Derivative of functions $\frac{1}{x}$, \sqrt{x}, $ax + b$, $ax^2 + bx + c$ by using definition, Rules of derivatives - addition, subtraction, multiplication, division and chain rule (without proof) and their examples by using the standard functions in the form x^n, a^x, $\log x$, e^{ax}.</p>	<p>Extending knowledge of calculus in terms of differentiation as a basic need to understand its application in various fields of commerce.</p>
3.	Application of Differentiation	<p>Definition of second order derivative, meaning and definitions of maximum and minimum value of a function and its application in business - cost, revenue, monopoly and profit related numerical problems. Application of derivatives in economics - elasticity of demand and supply and its interpretations, simple numeric examples related to it, meaning and definitions of M.R., A.R., M.C. and A.C. relation between η, A.R. and M.R. and its related examples.</p>	<p>Extending the application of derivatives in business and in economics.</p>
4.	Matrix Algebra	<p>Definition of Matrix, Different Types of Matrices, Addition, Subtraction and Multiplication of Matrices and related examples. Determinant of Square Matrix (up to order 3×3). Adjoint of Matrix and Inverse of a square Matrix (up to order 3×3).</p> <p>Solution of Simultaneous linear Equations systems with the help of Inverse Matrix (up to 3 variables) and related examples</p>	<p>Learning the basics of matrix and its application in business problems</p>

4. Course Learning Outcomes/Students' Learning Outcomes (SLO)

Course Learning Outcomes

1. This course helps to get feel of real life business problem and its conversion into functional forms.
2. This course gives basic knowledge of techniques of calculus which is useful to them for higher studies.
3. This course creates the knowledge about the application of derivatives in business and in economics.
4. Students get familiarity with the Learning the basics of matrix and its application in business problems

5. MODE OF EVALUATION

Evaluation will be divided in two parts:

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- **Continuous and Comprehensive Evaluation (CCE):** Continuous and Comprehensive Evaluation of 50 marks will be decided by the colleges / Institutes/ University departments as per the instruction given by the University time to time

6. Recommended learning Resources

1. Kapoor V. K.: Business Mathematics; Sultan Chand & Sons, New Delhi.
2. J. K. Sharma, Business Statistics, Pearson Education, New Delhi.
3. Sancheti & Kapoor, Business Statistics, Sultan Chand & Sons, New Delhi.
4. Trivedi and Trivedi: Business Mathematics, Pearson India Ltd. New Delhi.

GUJARAT UNIVERSITY
B. COM. (HONS)
SEMESTER – II (MINOR)
PROBABILITY AND DISCRETE PROBABILITY DISTRIBUTIONS
COURSE CODE – DSC- M STA 123
CREDIT MARK DISTRIBUTION – 04
AS PER NEP 2020 (To be effective from June 2023)

Lecture 04 Hours

Tutorial – 00

Practicum – 00

COURSE OBJECTIVES

Probability and Discrete Probability Distribution is a foundational course in probability theory that introduces students to the concepts and applications of probability in various fields. The course aims to develop students' understanding of probability and its discrete distributions, enabling them to solve problems involving uncertainty and randomness.

PRE – REQUISITE

A strong foundation in basic mathematics is essential for understanding the concepts of probability. Students should be familiar with arithmetic, algebra, and basic mathematical operations. An understanding of basic set theory is often necessary, as probability theory deals with events and their relationships in sample space. The learner should have basic knowledge of combinatorial principles, such as permutation and combination, is often required. Combinatory is used to count the number of possible outcomes in various scenarios. Familiarity with basic probability terminology, such as events, outcomes, sample space and probabilities, can be beneficial. This knowledge may be gained from introductory statistics or mathematics courses. Basic familiarity with mathematical notation, symbols, and concepts used in probability, such as summation, factorial notation, and set notation.

COURSE OUTCOMES

Upon successful completion of a course on Probability and Discrete Probability Distribution, Students will have a solid understanding of the fundamental concepts of probability, including events, sample space and the rules of probability. They will be able to interpret probabilities in various contexts involving uncertainty and randomness. Students will be proficient in applying combinatorial principles, such as permutation and combination to calculate the number of possible outcomes in different scenarios. Students will be able to define and analyze discrete random variables. They will understand the concept of probability mass function (PMF) and calculate probabilities associated with specific outcomes and sets of outcomes. Students will

be skilled in calculating the expected value (mean) and variance of discrete random variables. Overall, completing a course on Probability and Discrete Probability Distribution should enable students to think probabilistically, understand the probabilistic aspects of data, and apply these concepts to various practical scenarios in their academic and professional pursuits.

UNIT	CONTENT	WEIGHTAGE
1	<p>PROBABILITY</p> <ul style="list-style-type: none"> ➤ Introduction to Probability ➤ Terms Used in Probability <ul style="list-style-type: none"> Random Experiment Sample Space Event and Definition of Various Events ➤ Mathematical, Statistical and Axiomatic Definitions of Probability ➤ Addition Rule, Multiplication Rule and Sub Rules of the Probability (Without Proof) ➤ Conditional Probability ➤ Bayes' theorem (without proof) and its application up to three events ➤ Simple numerical examples based on the above concepts 	25%
2	<p>MATHEMATICAL EXPECTATION (For Discrete Random Variable)</p> <ul style="list-style-type: none"> ➤ Meaning of Discrete Random variable ➤ Meaning of Probability Distribution ➤ Meaning of Mathematical Expectation <ul style="list-style-type: none"> Properties of Mathematical Expectation (Without Proof) ➤ Variance of a Discrete Random Variable <ul style="list-style-type: none"> Properties of Variance (without proof) ➤ Mean and Variance of Linear Combination of Two Independent Variables ➤ Examples based on the above Concepts 	25%
3	<p>DISCRETE DISTRIBUTIONS -I</p> <ul style="list-style-type: none"> ➤ Concept of Probability Mass Function ➤ Introduction to Poisson Distribution <ul style="list-style-type: none"> Properties and Uses of Poisson Distribution ➤ Introduction to Hypergeometric Distribution <ul style="list-style-type: none"> Properties and Uses of Hypergeometric Distribution ➤ Examples Related to these Distributions 	25%
4	<p>DISCRETE DISTRIBUTIONS -II</p> <ul style="list-style-type: none"> ➤ Introduction to Negative Binomial Distribution <ul style="list-style-type: none"> Properties and Uses of Negative Binomial Distribution 	25%

	<ul style="list-style-type: none"> ➤ Geometric Distribution Properties and Uses of Geometric Distribution ➤ Examples Related to these Distributions 	
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MODE OF EVALUATION

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FBLD (Flip Blended Learning Design Template)

- Any One Unit from the above syllabus can be discussed by the faculty through online mode.
- Online mode can be SWAYAM MOOC Course or any other suggested by the UGC or Gujarat University.

REFERENCE BOOKS

1. "Introduction to Probability and Mathematical Statistics" by Prasanna Sahoo (published by CRC Press)
2. "Probability and Statistics" by T.K. V. Iyengar (published by S. Chand Publishing)
3. "Fundamentals of Probability, with Stochastic Processes" by Saeed Ghahramani (published by PHI Learning Private Limited)
4. "Probability and Random Processes" by S.V. Prabhu and P.G. Sankaran (published by John Wiley & Sons India Pvt. Ltd.)
5. "A First Course in Probability and Statistics" by B.L.S. Prakasa Rao (published by Universities Press)