

**Gujarat University**  
**B. Sc. Semester – IV – Statistics (Minor)**  
**Effective from June - 2024**

## **Prerequisite:**

B.Sc. Statistics is an undergraduate course that deals primarily with statistics, probability, and permutations. Students who are thinking of pursuing a BSc Statistics must have completed cleared semesters I and II with statistics subject as major, minor or multidisciplinary. A fundamentally sound knowledge of probability theory, random variables and probability distributions is desirable. Knowledge and exposure to any statistical tool is desirable. Students must have basic know how of numerical or qualitative information, methods of collecting numerical or qualitative information through attributes, graphical presentation and some primary measures, like arithmetic mean, median, mode.

## **Co-requisite**

Fundamental knowledge about use of scientific calculator and functionality of computers is necessary. Knowledge and basic understanding of MS – Office is recommended.

## **Vision and Outcome**

The aim of introducing statistics as a subject and scientific tool as well, at an undergraduate level is to provide students a strong theoretical foundation, which is on par with other institutions and colleges with reputation of national level. At the same time, enough care is taken to emphasize on the course contents that enhance the ability of students to gain knowledge of open-source statistical software. This enables students' understanding in dealing with real life problems from statistical viewpoint. The weightage is given to fieldwork and projects that make students develop statistical thinking and work independently.

## **Outcomes**

### **Programme Outcome**

Students will demonstrate an understanding of major concepts in statistics.

Students tend to think critically and apply their understanding to develop ability to design the mathematical model and with numerical data set its necessity of checking whether it is appropriate or not. Also, the concept of exact sampling distribution is introduced to derive probability distribution of different statistics defined on random samples and to verify whether they possess property of asymptotic normality or not.

**Programme Specific  
Outcome**

The ability to identify type of observable phenomena and probability distributions that are associated with observable phenomena. This helps them to collect the relevant data and to verify different properties of associated probability distribution. The design and execution of the proper statistical analysis reveals their understanding of good analytical skills and proper handling of statistical data that suits probability distributions introduced in Semester IV syllabus.

**Course**

**Outcomes**

**Statistics  
DSC- M – STA - 244T  
Statistics for Mathematics**

This course is designed to enable students to acquire basic understanding of advanced statistical probability distributions, their properties and applications.

The outcomes are:

1. Develop an understanding of advanced statistical probability distributions.
2. Students Shall learn the properties of advanced statistical probability distributions.
3. Students would be able develop an understanding of solving the problems based on these probability distributions.
4. Interrelationships of discrete probability distributions
5. Applications of discrete probability distributions.
6. Introduction of few applications oriented continuous distributions
7. Interrelationship of exponential family of distributions
8. Applications of this distributions in life testing and reliability, insurance claim analysis, quality control and capability analysis and other areas

**Statistics  
DSC-M- STA-244P  
(Practical)**

- At the end of the semester, students can identify nature of the probability distributions through mean, variance and other measures.
- Random sampling and fitting of probability distributions
- Test whether a particular probability distribution is applicable for the data gathered.
- Can ably obtain certain summary statistics in order to understand and analyze random phenomena through probability distributions.

This paper is based on Theory papers DSC – M – STA – 244T

### Course Structure with Credits, Lecture Hours and Marks

Course Code	Course Title	Credit	Lecture Hours Per Week	Exam Hours	Marks		
					Internal	External	Total
DSC- M – STA - 244T	Statistics for Mathematics	2	2	1.5	25	25	50
DSC- M – STA – 244P	Practical	2	4	1.5	25	25	50

**Gujarat University**  
**NEP (2020)**  
**Syllabus for B.Sc. Semester IV (Statistics- Minor)**  
**DSC-M-STA-244 T**  
**Statistics for Mathematics**  
**Effective from June, 2024**

**HOURS: 2 / week**

**CREDIT: 2**

**Unit I: Discrete Probability Distribution– I**

- Bernoulli distribution,
- Binomial distribution
- Poisson distribution
- Hyper geometric distribution
- Derivation, basic properties of these distributions – Mean, Variance, moment generating function and moments, cumulant generating function,
- Applications and examples of these distributions.

**Unit II: Continuous Probability Distribution-I**

**Uniform / Rectangular Distribution**

**Exponential Distribution**

**Beta type I and type II distribution**

- Derivation, basic properties of these distributions – Mean, Variance, moment generating function and moments, cumulant generating function,
- Applications and examples of these distributions.

**Reference Books:**

1. Hogg, R.V. and Craig, A.T. (1972): Introduction to Mathematical Statistics, Amerind Publishing Co.
2. Mood, A.M., Greybill, F.A. and Bose, D.C. (1974): Introduction to the Theory of Statistics, McGraw Hill.
3. Mukhopadhyay, P. (1996): Mathematical Statistics, New Central Book Agency.
4. Rohtagi, V.K. (1967): An Introduction to Probability Theory and Mathematical Statistics, John Wiley and Sons.
5. Hoel, P.G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
6. Meyer, P.L. (1970): Introductory Probability and Statistical Applications, Addison Wesley.
7. Gupta, S.C., and Kapoor, V.K. Fundamentals of Mathematical Statistics, Sultan Chand Publications.
8. Goon, A.M., Gupta, M.K. and Das Gupta, B. (1991): Fundamentals of Statistics, Vol. I, WorldPress, Calcutta.
9. A First Course in Probability - Sheldon.M.Ross, (Mc Millian publishing Co.)
10. Introduction to Probability and Statistics for Engineers and Scientists-S.M. Ross (Elsever)

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**DSC-M-STA -244P**  
**(Practical based on DSC-M-STA -244T)**

**Part A( manual)**

1. Drawing a random sample from: Binomial distribution.
2. Drawing a random sample from: Poisson distribution.
3. Drawing a random sample from: Uniform distribution.
4. Drawing a random sample from: exponential distribution.
5. Fitting of binomial distributions.
6. Fitting of Poisson distributions.

**Part B (computer)**

1. Drawing a random sample from: Binomial distribution.
2. Drawing a random sample from: Poisson distribution.
3. Drawing a random sample from: Uniform distribution.
4. Drawing a random sample from: exponential distribution.
5. Fitting of binomial distributions.
6. Fitting of Poisson distributions.