Gujarat University

B. Sc. Semester – II Statistics (Multi Disciplinary)

Prerequisite:

BSc 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 10+2 in the fields of Mathematics, Physics and Chemistry. A fundamentally sound knowledge of limit and continuity, derivatives - Total and partial, and integration 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, collection, presentation, analyse and interpret of data based problems of real life situations.
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.

Course	Outcomes
Statistics **MDC-STA -124T** **(Theory)**	The design of this course helps learning basic concept of probability and its application. The paper is about to develop a scientific thinking. Outcomes: 1. Students easily generate sample space, identify its type, define associated events and find probabilities of different events as well. 2. Students can define random variable with prior knowledge of sample space and probability and develop probability distribution. 3. Students can obtain Moments generating functions in order to study properties of probability distributions. 4. Various probability inequalities, idea of bivariate distribution and joint probability distribution will be clear.
Statistics **MDC- STA -124P** **(Practical)**	At the end of the semester, students can identify nature of the problem, and can calculate probabilities of different events. Also, students can ably obtain certain summary statistics for probability distributions of random variables. This will help them to understand the other associated methods and procedures used in analysis in a better way. Topics for this paper are based on theory paper **MDC-STA – 124T**

Gujarat University

B. Sc. Semester – II – Statistics (Multi disciplinary)
Elements of Probability

Course Structure with Credits, Lecture Hours and Marks

Course Code	Course Title	Credit	Lecture Hours Per Week	Exam Hours	Marks		
					Internal	**External**	**Total**
MDC-STA - 124T	**Elements of Probability (Theory)**	**2**	**2**	**2**	**25**	**25**	**50**
MDC-STA-124P	**Elements of Probability (Practical)**	**2**	**4**	**2**	**25**	**25**	**50**

Syllabus for Statistics (UG)
B. Sc. Semester II

MDC-STA-124T (Elements of Probability Theory)

Hours per week: 2 **Credit: 2**

Unit: 1 Probability

Definition of factorial (Patiganita of sridhar.) the theory of permutations and combinations (433-357 BCE by Bhadrabahu;), the game of dice (Patiganita of Sridhar). (Gambling in mahabharata)

Random Experiment, trial, sample point, sample space, definition of equally likely, mutually exclusive and exhaustive events.

Definition of probability: classical, relative and axiomatic approach and its properties.

Conditional probability, multiplicative law of probability, Boole's inequality, Bonferroni's inequality, Chebyshev's Inequality. Independence of events, law of total probability, Bayes theorem and its applications.

Unit: 2 Random Variable (Univariate and Bivariate)

Random Variable (rv) with its types, probability mass function (pmf), probability density function (pdf), cumulative distribution function (cdf) with illustrations.

Expectation of Random variables with properties,

Concept of Joint Distributions, Joint probability mass function and Joint probability density function. Marginal and conditional distributions, independence of random variables, conditional expectation and conditional variance. Product moments.

Reference books MDC-STA-124T (Elements of Probability Theory)

1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., Mc Graw Hill.
4. Fundamentals of Mathematical Statistics, S. C. Gupta and V. K. Kapoor, Sultan Chand and Sons, New Delhi.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.
7. K. V. S. Sarma : Statistics Made Simple : Do it yourself on PC. Prentice Hall of India Pvt. Ltd., New Delhi.
8. Amir D. Aczel and Jayael Soundarpandiyan, Complete Business Statistic : McGraw Hill Education (6th Edition).
9. Kothari C.R. : Research Methodology, Wiley Eastern Limited.
10. Hogg R.V. and Tannis E.P. : Probability and Statistical Inference. McMillan Publishing Co. Inc
11. Pitan Jim : Probability, Narosa Publishing House.
12. A First Course in Probability - Sheldon.M.Ross (Mc Millian publishing Co.)

Syllabus for Statistics (UG)
B. Sc. Semester II

COURSR CODE: MDC-STA-124P

Elements of Probability Theory (Practical)

Hours per week: 4 **Credit: 2**

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1. Practical based on probability from the given data and bivariate table.
2. Practical based on Bayes theorem
3. Practical based on skewness and kurtosis.
4. Practical based on marginal and conditional distributions.
5. Practical based on moments of joint, marginal and conditional distributions.