

M. G. Science Institute, Ahmedabad

Autonomous | Affiliated to Gujarat University, Ahmedabad

(Managed by The Ahmedabad Education Society)

Department of Statistics

Bachelor of Science (Hons.) in Statistics

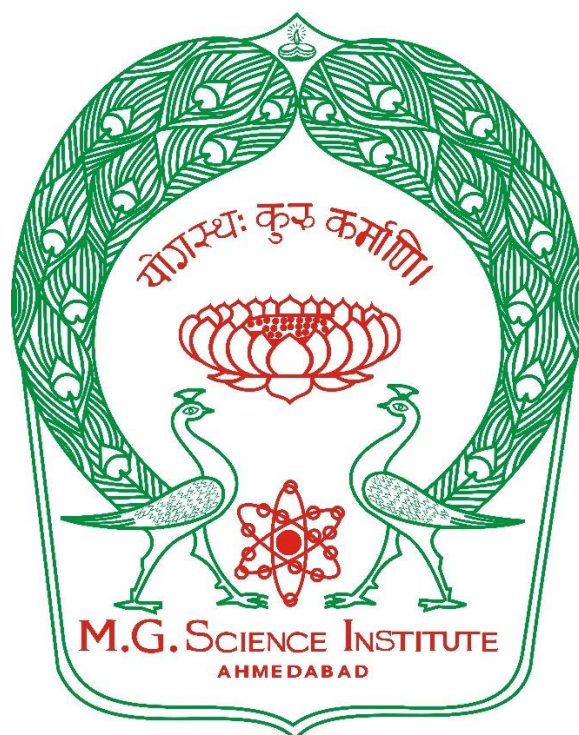
B.Sc. (Hons.) Statistics

4 Year, 8 Semester Full-Time Programme

Choice Based Credit System (CBCS) & Grading System

Outcome-Based Education Pattern

(Effective from Academic Year 2024-25)



Detailed Syllabus for Each Course B.Sc. (Hons.) Statistics

STM351 Sampling Distributions

Semester: V	Course Title: Sampling Distribution	Credit: 4
Course No.: STM351		Hours: 4/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Recall fundamental concepts of sampling distributions and related probability distributions (Chi-square, t, F, Z).
CO 2	UNDERSTANDING	Explain properties and interrelationships of Chi-square, t, F, and Z distributions.
CO 3	APPLYING	Apply the concepts of sampling distributions to compute probabilities and solve problems in statistical inference.
CO 4	ANALYSING	Analyse convergence concepts, inequalities, and limit theorems to interpret sampling behaviour of statistics.
CO 5	EVALUATING	Evaluate different sampling distributions and test statistics for appropriateness in data analysis.
CO 6	CREATING	Construct confidence intervals, hypothesis tests, and probabilistic models based on sampling distribution results.

CO-PO Mapping

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	0	0
CO2	2	3	2	1	0
CO3	1	2	3	2	1
CO4	0	1	2	3	2
CO5	0	1	2	3	3
CO6	0	0	1	2	3

Unit	Detailed Syllabus	No. of Hours of Teaching
I	<p>Introduction to Sampling</p> <ul style="list-style-type: none"> - Concepts of population, parameter, Fundamentals of Sampling, Introduction to Sampling, Errors in Surveys, Probability and non-Probability Sampling Methods, - Random sample from a distribution, statistics and its sampling distribution, <p>Chi-Square Distribution</p> <ul style="list-style-type: none"> - Definition and derivation of Chi-square variate - Properties of Chi square distribution – - Mean and variance, raw moments, moment generating function, cumulant - generating function, cumulants, additive property, skewness, 	15

	- Distribution of ratio of two independent chi square variates	
II	t Distribution <ul style="list-style-type: none"> - Definition and derivation of t – distribution - Student’s t and Fisher’s t, and relationship between them - Other properties of t distribution - General idea about the derivation of the distribution of sample correlation coefficient - Applications of t – distribution 	15
III	F Distribution and Z-Transformation <ul style="list-style-type: none"> - Definition and derivation of F – distribution - Other properties of F distribution - Application of F – distribution - Derivation of Z - Transformation and related properties - Relation between Chi-square, t and F distributions 	15
IV	Tchebychev’s Inequality, convergence and Central Limit Theorem <ul style="list-style-type: none"> - General form of Tchebychev’s inequality – other forms of Chebyshev’s inequality, and applications with examples - Convergence – Convergence in probability and convergence in Distribution and their theorems without proof. - Weak law of large numbers, Bernoulli’s weak law of large numbers with simple examples, - Central limit theorem (iid case only) and its applications - Statements of Lindberg Levy form and Liapounoff’s Theorem with their applications. 	15

Suggested Reference Books:

1. Gupta, S. C. And Kapoor, V. K. (2005): Fundamentals of Applied Statistics, Sultan Chand & Sons.
2. Mukhopadhyay P. (1999): Applied Statistics
3. Gupta, S. C. (2005): Business Statistics, Himalaya Publishing House.