



**ST. XAVIER'S COLLEGE – MUMBAI**  
**(Est. 1869)**

**(An Autonomous College affiliated with the University of Mumbai)**

**Syllabus for Four-Year Undergraduate  
Programme as per National Education Policy  
(NEP-2020)**

**Programme:  
BA in STATISTICS**

**The academic year 2024–2025**



**APPROVED SYLLABUS**

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PRINCIPAL  
ST. XAVIER'S COLLEGE  
(AUTONOMOUS)  
MUMBAI - 400 001.

# Syllabus

## Third Semester Courses in Statistics

### 2024-2025

#### Contents:

- Syllabus for Minor Courses:
  - UASTA5001MN1 : Statistical Techniques (A)
  - UASTA5001MN1PR : Statistical Techniques (A)(Practical)
  
- Evaluation and Assessment guidelines



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Second Year BA in Statistics		
Course Title: Statistical Techniques (A)		Course Code: UASTA5001MN1
Credits: Theory (3) = 45 hr		
No.	Course Objectives The course aims to	
1	learn Normal (Gaussian), Gamma, and Beta distributions and their certain properties.	
2	understand concepts of Estimation, Testing of hypothesis and Large sample tests.	
3	study Chi-square, t and F distributions, their properties and application.	
CO	Course Outcomes On completing the course, the learner will be able to	Bloom's Taxonomy Level (BT level)
1	i) identify and define pdf/summary statistics of the various continuous distributions ii) know the concepts involved in estimation, testing of hypothesis and large sample tests.	Knowledge
2	derive properties and explain applications of continuous distributions(Normal, Gamma, Chi-sqaure, t, F), estimation, testing of hypothesis and large sample tests.	Understanding
3	solve numericals based on the above topics.	Analysis

**Unit 1 : Normal (Gaussian) and Gamma Distributions:**

(15 L)

Definition & properties. Mean, Standard Deviation. Additive property of Normal distribution. Fitting of Normal Distribution. Central Limit Theorem, limiting form of Binomial and Poisson distribution (statement only). Gamma Distribution, its mean and variance.



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**Unit 2: Estimation, Testing of Hypothesis & Large Sample Tests:**

(15 L)

Concept of Parameter, Statistic, Estimator and bias. Sampling distribution of estimator. Standard error and M.S.E. of an estimator. Sampling distribution of sample mean and sample proportion for large samples. Point and interval estimation of single mean and single proportion, for large sample only. Statistical tests - Concept of Hypotheses. (Null and Alternative Hypotheses, simple and composite Hypotheses.). Types of Errors, Critical Region, Level of Significance, p-value, Tests of significance for large samples (single mean, difference of means, single proportion, difference of proportions).

**Unit 3: Chi-Square, t and F Distributions and their applications:**

(15 L)

Definition & properties of Chi-Square, t & F-distributions.

Applications of Chi-Square Distribution:

Test of significance for specified variance of Normal population.

Test for independence of attributes (2x2 and r x c contingency tables), Yate's correction.

Test for Goodness of Fit.

Applications of t-distribution:

Tests of significance for:

i) Single population means.

ii) Difference between two population means

a) with equal & unequal (Welch's test) variances based on independent samples.

b) based on paired observations.

Applications of F-distribution: test for equality for two variances of two normal populations.

**List of Recommended Reference Books:**

1. Fundamentals of Mathematical Statistics, S.C. Gupta and V.K. Kapoor: 8<sup>th</sup> edition, Sultan Chand & Sons.
2. Outline of Statistical Theory – Volume I, A.M. Goon, M. K. Gupta, B. Dasgupta: 3<sup>rd</sup> edition, The World Press Pvt Ltd.
3. Introduction to Theory of Statistics, Mood, Graybill and Boes: 3<sup>rd</sup> edition, Mc Graw-Hill Publishers.
4. Introduction to Mathematical Statistics, R. V. Hogg & A. T. Craig: 4<sup>th</sup> edition, Collier Mc Millan Publishers.
5. Statistical Methods: Welling, Khandeparkar, Pawar, Naralkar Manan Publications. First edition.
6. Statistical Methods: R.J. Shah – Seth Publications. Tenth edition.

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**Evaluation (Theory, UASTA5001MN1): Total marks per course - 100.**

- I. Formative Assessment for Learning  
(continuous internal assessment - CIA to improve learning).  
CIA: 40 marks  
CIA 1: Written test: 20 marks  
CIA 2: Written test/Assignment: 20 marks
- II. Summative Assessment of Learning  
(focus on outcomes, quantitative data for outcomes of instruction).  
End Semester Examination: 60 marks  
One question from each unit for 20 marks, with internal choice.  
Total marks per question with choice: 25 to 27.

**Distribution of Bloom's Taxonomy levels for the course assessment:**

Learning Levels	Knowledge	Understanding	Analysis
% Weightage	10-20%	60-80%	10-20%

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<b>Second Year BA in Statistics</b>		
<b>Course Title: Statistical Techniques (A)(Practical)</b>		<b>Course Code:UASTA5001MN1PR</b>
Credits: Practical (1) = 30 hr		
<b>No.</b>	<b>Course Objectives</b>	
	The course aims to	
1	apply the concepts of estimation, testing of hypothesis, properties and applications of various standard continuous distributions and solve numericals.	
<b>CO</b>	<b>Course Outcomes</b>	<b>Bloom's Taxonomy Level (BT level)</b>
	<b>On completing the course, the learner will be able to</b>	
1	use the concepts of estimation, testing of hypothesis, properties and applications of various standard continuous distributions and solve numericals.	Analysis

**List of Practicals:**

1. Normal Distribution
2. Testing of hypothesis: finding probabilities of type I, type II errors, power function.
3. Large Sample Tests
4. Chi-square Distribution
5. t- Distribution
6. F- Distribution

**Evaluation (Practical, UASTA5001MN1PR)**

**Total marks practical course - 50**

- CIA (Written test /Project): 15 marks,
- Journal: 5 marks,
- End Semester Examination: 30 marks.

**Distribution of Bloom's Taxonomy levels for the practical assessment:**

Learning Levels	Analysis
Percentage	100%



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