

(Applicable to the batch of students admitted in the academic year 2025-2026)

**B.Sc..(Data Science) (CBCS)**

**FACULTY OF SCIENCE, IIMC**

**B.Sc.(DATA SCIENCE)**  
**II Semester Syllabus (CBCS)**  
(w.e.f. 2025-26)



**FACULTY OF SCIENCE**  
**Department of Statistics**  
**INDIAN INSTITUTE OF**  
**MANAGEMENT & COMMERCE**  
**Autonomous College (UG & PG)**  
*# 6-1-91, Khairatabad, Hyd- 500 004, T.S*

## B.SC. (CBCS) (STATISTICS) SYLLABUS (With Mathematics Combination only)

**With effect from the Academic Year: 2025-26 Onwards**

Year	Sem	Paper code	Theory/ Practical	Paper Title	Cred its	Work Load (Hours / Week)	Total Marks
I	I	Bs-101-T	Paper-I	Basic Statistics And Probability	4	4	80
		BS-101-P	Practical -I	Basic Statistical Analysis Lab using Excel & R	1	2	20
	II	BS-202-T	Paper-II	Probability Distributions	4	4	80
		BS-202-P	Practical -II	Probability Distributions Lab using Excel & R	1	2	20
II	III	BS-303-T	Paper-III	Statistical Inference	4	4	80
		BS-303-P	Practical-III	Statistical Inference lab using Excel & R	1	2	20
	IV	BS-404-T	Paper-IV	Analysis of Correlation, Regression and Basic Experimental Designs	4	4	80
		BS-404-P	Practical-IV	Analysis of Correlation, Regression and Basic Experimental Designs Lab	1	2	20
III	V	BS-505-T	Paper-V	Sampling Theory & Operation Research	4	4	80
		BS-505-P	Practical-5	Sampling Theory & Operation Research Lab	1	2	20
		BS-501-SEC	SEC-1	Skill Enhancement Course -1 (University Specified)	2	2	50
		BS-502-SEC	SEC-2	Skill Enhancement Course -1 (Subject Specified: Data Collection, Presentation and Interpretation)	2	2	50
		BS-501-MDC	MDC	Statistical Analysis	4	4	70E+30I
		BS-505-VAC	VAC	Value Added Course-1	3	3	70
	VI	BS-606-T	Paper-VI	Industrial Statistics	4	4	80
		BS-606-P	Paper-VI	Industrial Statistics	1	2	20
		BS-603-SEC	SEC-3	Skill Enhancement Course -2 (University Specified)	2	2	50
		BS-604-SEC	SEC-4	Skill Enhancement Course -2 (Subject Specified: Data Scaling Techniques and Report Writing)	2	2	50
		BS-602-VAC	VAC	Value Added Course-2	3	3	70
		BS-601	Internship	Data Analysis Project	4	8	100

**Note:**

1. No of credits = No of theory hours for teaching = twice the no. of credits for practical teaching.

## B.Sc. FIRST YEAR II-SEMESTER SYLLABUS

### BS-202-T: PAPER-II (Theory): PROBABILITY DISTRIBUTIONS

[4 HPW:: 4 Credits :: 80 Marks (External: 50, Internal: 30) ]

#### Course Objectives:

1. Able to choose / identify an appropriate standard probability distribution to fit the data.
2. Able to know and derive the properties of standard probability distributions (discrete and continuous) and knowing perfectly on the usage of each probability distribution in different domains.
3. Able to understand the concept of sampling distributions
4. Able to understand the exact sampling distributions, their properties and applications.

#### UNIT-I

**Discrete distributions:** Discrete *Uniform* and *Bernoulli* distributions: definitions, mean, variance and simple examples. *Binomial*, *Poisson*, *Negative-Binomial* and *Geometric* distributions: Physical conditions. derivation of probability mass functions, central and moments up to fourth order, median, mode, M.G.F, C.G.F., P.G.F., Ch. F. nature of the curve and, reproductive property (wherever exists) special properties if any and real-life applications in various domains and probability problems related to these distributions. Poisson approximation to Binomial distribution, Poisson approximation to Negative binomial distribution.

#### UNIT-II

*Hyper-geometric* distribution: definition, real life applications, derivation of probability function, mean, variance. Binomial approximation to Hyper-geometric distribution.

**Continuous distributions:** *Rectangular* and *Normal* distributions - definition, properties such as M.G.F, C.G.F., Ch. F. and moments up to fourth order, reproductive property, wherever exists and their real-life applications. Normal distribution as a limiting case of Binomial and Poisson distributions.

#### UNIT-III

*Exponential*, single and two parameter *Gamma* distributions: Definition, Moments up to fourth order, M.G.F, C.G.F., Ch. F., reproductive property (wherever exists), nature of the curves and their real-life applications special properties (if any) and problems. *Beta* distribution of two kinds: Definitions, mean and variance, nature of the curve, special properties (if any) & applications. *Cauchy* distribution: Definition, nature of the curve, derivation of density, Ch. f. and its special properties and its statistical significance.

#### UNIT-IV

**Exact Sampling Distributions:** Concepts of Population, Parameter, sample, Statistic, Sampling distribution and Standard error. Standard errors for various statistics. Exact sampling distributions:  $\chi^2$ , t and F Definitions, curves and properties of distributions and their interrelationships. Independence of sample mean and variance in random sampling from normal distributions.

**Course Outcome:**

1. Able to evaluate the probability analyse the data sets by choosing appropriate statistical tool and preparing basic statistical report.
2. Able to compute the probability using counting methods / appropriate probability theorems.
3. Able to evaluate the distribution function from probability mass / density functions and vice-versa and also evaluation of probability function for the transformations of random variables.
4. Able to evaluate the Moments, MGF, CGF PGF and Ch. F. for any probability function.
5. Able to identify the real time applications for each distribution in various domains like Finance, business, insurance, clinical, medical, health, bio sciences, engineering and technology etc.

**List of reference books:**

1. V. K. Kapoor and S. C. Gupta: Fundamentals of Mathematical Statistics, Sultan Chand & Sons, New Delhi.
2. Sanjay Arora and Bansilal: New Mathematical Statistics, Satya Prakashan , New Delhi.
3. William Feller: Introduction to Probability theory and its applications, (Vol-I), Wiley.
4. Goon A M, Gupta M K, Das Gupta B: Fundamentals of Statistics, (Vol-I), The World Press (Pvt) Ltd., Kolkata.

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## **B.Sc. FIRST YEAR II-SEMESTER SYLLABUS**

### **BS-202-P: PAPER-II (Lab):**

## **PROBABILITY DISTRIBUTIONS USING MS-EXCEL & R**

**(2 HPW :: 1 Credit :: 20 Marks)**

#### **Topics to be covered:**

1. Fitting of Binomial distribution (Direct & Recurrence relation Methods).
2. Fitting of Poisson distribution (Direct & Recurrence relation Methods).
3. Fitting of Negative Binomial (Direct & Recurrence relation Methods).
4. Fitting of Geometric distribution.
5. Fitting of Normal distribution (Areas & Ordinates method)
6. Fitting of Exponential distribution.
7. Fitting of Cauchy distribution.
8. Generation of random samples from Uniform (0,1) and Uniform (a, b) distributions.
9. Generation of random samples from Binomial, Poisson, Negative Binomial Distributions.
10. Generation of random samples from Normal and Exponential Distributions.

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#### **Note:**

1. Each student has to spend minimum 15 weeks X 2 hours per week = 30 hours to practice on the system with the required software is mandatory.
2. Establishing formulae in Excel cells and deriving the results and also usage existing Excel statistical functions in Excel.
3. Writing R-program for evaluation and usage of libraries in R
4. Maintaining the Practical records is mandatory and without records candidates are not allowed to attend practical examination.
5. Answer any two out of four choosing at least one from each section of Excel and R having two questions in each.