

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

B.Sc..(Statistics) (CBCS)

FACULTY OF SCIENCE, IIMC

B.Sc.(STATISTICS)

Syllabus (CBCS)

(w.e.f. 2025-26)



FACULTY OF SCIENCE

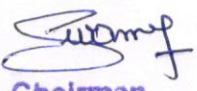
Department of Statistics

INDIAN INSTITUTE OF

MANAGEMENT & COMMERCE

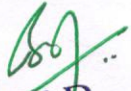
Autonomous College (UG & PG)

6-1-91, Khairatabad, Hyd- 500 004, T.S


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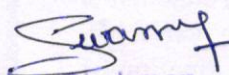

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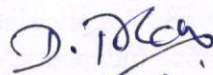
B.A./B.SC. (CBCS) (STATISTICS) SYLLABUS
(With Mathematics Combination only)
With effect from the Academic Year: 2025-26 Onwards

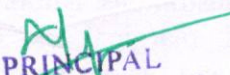
Year	Sem	Paper code	Theory/ Practical	Paper Title	Cred its	Work Load (Hours / Week)	Total Marks
I	I	Bs-101-T	Paper-I	Basic Statistics And Probability	4	4	80
		BS-101-P	Practical -I	Basic Statistical Analysis Lab using Excel & R	1	2	20
	II	BS-202-T	Paper-II	Probability Distributions	4	4	80
		BS-202-P	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+301
		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

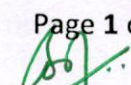
Note:

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


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2. Skill Enhancement Courses (SEC) are offered for Statistics students in Sem-V & VI with continuation (offered for who are willing improve the practical skills in conducting of election forecasts / exit poll surveys.
3. Multi-disciplinary course and Value-added courses are offered in Final year.
4. Optional paper course is offered if statistics students are willing to opt.

B.SC. FIRST YEAR I-SEMESTER SYLLABUS

BS-101T: PAPER-I (Theory): BASIC STATISTICS AND PROBABILITY

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

Course Objectives:

1. Able to compute and analyze the data sets (with different measurement of scales of variables in data sets, nominal, ordinal, interval, Ratio scales) based descriptive statistics like, Central tendencies, Dispersions, Moments, Skewness and Kurtosis.
2. Able to familiar in to prepare the Basic descriptive statistical report using descriptives.
3. Strong foundations on the computation of the probability for the events and usage of addition, multiplication and Bayes theorems for probability computation, where ever the situation occurs.
4. Understanding the concept of one and two-dimensional random variable(s), probability mass / density / distribution functions and their properties and transformation of one/two dimensional random variables.
5. Understanding the procedure of evaluation Central and Non-central Moments for the random variables and also its evaluation from various generating functions.

UNIT-I

Basic Statistics: Definitions, Measures, Properties and Importance of Central tendencies, Dispersions, Absolute and Relative measures of dispersions, Central and Non-central moments, Skewness and kurtosis and their inter-relationships and computations to the raw & grouped data and data sets. Usage in the domains of image analysis, pattern recognitions, Preparation of descriptive statistical analysis report based on the above descriptive statistics.

UNIT-II

Probability: Basic concepts used for defining probability, Mathematical, Statistical and Axiomatic definitions of probability, their merits and demerits. Marginal, Joint and Conditional probabilities and independence of events, Multiplication & Addition theorems for 'n' events, Boole's inequality and Bayes' theorem, Problems on computation of Probability and including the usage of theorems.

UNIT-III

Random Variables: Definition of random variable, discrete and continuous random variables, functions of random variables, probability mass, density and distribution functions with their properties and simple problems and illustrations. Notion of bivariate random variable, bivariate distribution, statements of its properties, Joint, marginal and conditional distributions, Independence of random variables. Transformation of one and two-dimensional random variable(s), simple problems on transformation of the random variable(s).

UNIT-IV

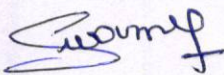
Mathematical Expectation: Mathematical expectation of a random variable, function of a random variable, Computation of raw and central moments, covariance using mathematical expectation with examples, Addition and multiplication theorems of expectation. Generating function, Definitions of moment generating function (MGF), cumulant generating function (CGF), probability generating function (PGF) and characteristic function (Ch.F), their basic properties, applications and computation of those for simple probability functions, Moment inequalities: Chebyshev's and Cauchy-Schwartz's inequalities and their applications.

Course Outcome:

1. Able to analyze the data sets by choosing appropriate statistical technique either manually or using Excel & R 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 ChF for the random variables and evaluation Moments from the generating functions (MGF, CGF and ChF).
5. Able to identify the real time applications in various domains like Finance, business, insurance, clinical, medical, health, bio sciences, engineering and technology etc.

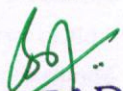
List of Reference Books:

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. S.P. Gupta: Statistical Methods, S Chand, New Delhi.


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B.SC. FIRST YEAR I-SEMESTER SYLLABUS

BS-101-P: PAPER-I (Lab):

BASIC STATISTICAL ANALYSIS USING EXCEL & R

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

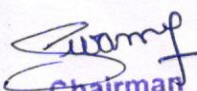
Basics of EXCEL: Excel- Data entry, editing and saving, establishing and copying formulae, creation of filters, sorting data, creation of databases usage of mathematical, statistical built in functions in excel, copy and paste and exporting to MS word document. Writing formulas for computation, drawing diagrams.

Basics of R-programming: Installation of R & R-studio, data importing / exporting, Basic Mathematical and statistical functions, writing simple programs and libraries/ usage packages.

1. Data Visualization Techniques (Histogram, Frequency curves & Polygon, Ogive curves, Bar (Simple. Component, Multiple, Percentage Bars) and Pie (Simple & multiple)
2. Computation of Central Tendencies, Dispersions, Moments (non-central and central).
3. Computation of coefficients of Skewness and Kurtosis.
4. Preparation of Statistical Analysis Report based on the descriptive statistics.

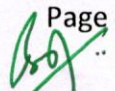
Note:

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. Practice also be done on data sets available in web sources: www.kaggle.com, <https://iee-dataport.org/datasets>, <https://data.world/datasets/link>, <https://archive.ics.uci.edu>, (Few selected data sets are: Fishers Iris data set, heart_failure_clinical_records, cancer, Mental Health Dataset, Indian Food Dataset, water-quality-1, etc.)
3. Establishing formulae in Excel cells and deriving the results and also usage existing Excel statistical functions in Excel.
4. Able to write an R-program for evaluation and also usage of libraries/ packages in R
5. Maintaining the Practical records is mandatory and without records candidates are not allowed to attend practical examination.
6. Answer any two out of four choosing at least one from each section of Excel and R having two questions in each.


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