

Deccan Education Society's

Kirti M. Doongursee College of Arts, Science and Commerce (AUTONOMOUS)



Affiliated to

UNIVERSITY OF MUMBAI

Syllabus for
Program: Bachelor of Science
Course: F.Y.B.Sc.
Subject: Statistics

Choice Based Credit System (CBCS)
with effect from
Academic Year 2024-2025

PROGRAM OUTCOMES

PO	Description
A student completing Bachelor's Degree in Science Program will be able to	
PO1	Disciplinary Knowledge: Demonstrate comprehensive knowledge of the disciplines that form a part of a graduate Programme. Execute strong theoretical and practical understanding generated from the specific graduate Programme in the area of work.
PO2	Critical Thinking and Problem solving: Exhibit the skills of analysis, inference, interpretation and problem-solving by observing the situation closely and design the solutions.
PO3	Social competence: Display the understanding, behavioral skills needed for successful social adaptation, work in groups, exhibits thoughts and ideas effectively in writing and orally.
PO4	Research-related skills and Scientific temper: Develop the working knowledge and applications of instrumentation and laboratory techniques. Able to apply skills to design and conduct independent experiments, interpret, establish hypothesis and inquisitiveness towards research.
PO5	Trans-disciplinary knowledge: Integrate different disciplines to uplift the domains of cognitive abilities and transcend beyond discipline-specific approaches to address a common problem.
PO6	Personal and professional competence: Performing dependently and collaboratively as a part of team to meet defined objectives and carry out work across interdisciplinary fields. Execute interpersonal relationships, self-motivation and adaptability skills and commit to professional ethics.
PO7	Effective Citizenship and Ethics: Demonstrate empathetic social concern and equity centered national development, and ability to act with an informed awareness of moral and ethical issues and commit to professional ethics and responsibility.
PO8	Environment and Sustainability: Understand the impact of the scientific solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

Deccan Education Society's
Kirti M. Doongursee College (Autonomous)

Proposed Curriculum as per NEP 2020

Year of implementation- 2024-25

Name of the Department: Statistics

Semester	Course Code	Course Title	Vertical	Credit
I	K24USSTATMJ111	Statistical Methods– I	Major	2
	K24USSTATMJP11	Practical I	Major	2
	K24USSTATVC141	Elementary To Advanced Excel	VSC	2
	K24USSTATSE151	Introduction To Excel	SEC	2
II	K24USSTATMJ211	Statistical Methods– II	Major	2
	K24USSTATMJP21	Practical II	Major	2
	K24USSTATOE241	Introduction to Statistics-I	OE	2
	K24USSTATVC241	Optimization Models Using Excel	VSC	2
	K24USSTATSE251	Statistics Using MS- Excel	SEC	2

Course Code	MAJOR SEM – I	Credits	Lectures /Week
K24USSTATMJ111	Paper I - Statistical Methods - I	2	2
Course Outcomes: After successful completion of this course, students would be able to • Define the concept of random variable and its probability distribution including properties. • Discuss basic rules of Probability. • Compute the probabilities of different events. • Calculate probabilities and derive the marginal and conditional distributions of bivariate random variables.			
Unit	Topics	No of Lectures	
I	Elementary Probability Theory - Trial, random experiment, sample point and sample space. - Definition of an event. Operation of events, mutually exclusive and exhaustive events. - Classical (Mathematical) and Empirical definitions of Probability and their properties. - Theorems on Addition and Multiplication of probabilities. - Independence of events, pairwise and mutual independence for three event, Conditional probability. - Bayes theorem and its applications.	15	
II	Discrete Random Variable and Some Standard Discrete Distributions Random variable. Definition and properties of probability distribution and cumulative distribution function of discrete random	15	

	variable. b) Raw and Central moments (definition only) and their relationship (up to order four). c) Expectation of a random variable. Theorems on Expectation & Variance. d) Discrete Uniform, Binomial and Poisson distributions and derivation of their mean and variance. Bivariate Probability Distributions: Two dimensional Discrete random variables: e) Joint Probability mass function and its properties f) Distribution function of (X,Y) and its properties g) Definition of raw and central moments, covariance, correlation coefficient, h) Independence and correlation between two variables i) Marginal and conditional probability distributions j) Conditional expectation, conditional variance.	
Textbooks: • Gholba-Phatak: Statistical Methods, Vipul Prakashan. • Welling-Khandeparkar: Statistical Methods, Manan Prakashan. • Dr. Kore B. G. and Dr. Dixit P. G.: "Elementary Probability Theory", Nirali Prakashan, Pune. Additional References: • Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand. • Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill. • Hogg, R. V., Tanis, E.A. and Rao J.M.: Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.		

Course Code	SEM I	Credits	Lectures/ Week
K24USSTATMJP11	Practical - I	2	4
Course Outcomes: After successful completion of this course, students would be able to: • Represent statistical data diagrammatically and graphically. • Compute various measures of central tendency, dispersion, moments, skewness and kurtosis. • Understand Association and Independence of Attributes. • Apply the laws of probability. • Find various measures of discrete random variable and probabilities using its probability distribution. • Calculate probabilities and derive the marginal and conditional distributions of bivariate random variables.			
1	Tabulation		
2	Attributes		
3	Classification of Data		
4	Graphs and Diagrams		
5	Measures of central tendency- I		
6	Measures of central tendency- II		
7	Measures of dispersion		
8	Probability - I		
9	Probability - II		
10	Discrete Random Variables - I		
11	Discrete Random Variables - II		
12	Discrete Distributions		
13	Discrete Bivariate Random Variables		

Course Code	VOCATIONAL SKILL COURSE SEM – I	Credits	Lectures/ Week
K24USSTATVC141	Paper I - Elementary To Advanced Excel	2	2
Course Outcomes: After successful completion of this course, students would be able to • Know how to navigate the Excel user interface and use Excel commands. • Understand how to insert, delete, and adjust cells, column and rows. • Learn how to apply conditional formatting and work with ranges and charts. • Discover how to sort, filter and query data with database functions. • Understand how to create and modify tables, use lookup functions and apply data validation.			
Paper I			
1	Data Entry and Autofill Function		
2	Graphs and Diagrams		
3	Mathematical Functions Using MS-Excel		
4	Sort and Filter		
5	Tabulation using Pivot charts		
6	If and Text functions		

Course Code	SKILL ENHANCEMENT COURSE SEM – I	Credits	Lectures /Week
K24USSTATSE151	Paper I – Introduction to Excel	2	2
Course Outcomes: After successful completion of this course, students would be able to • Know how to navigate the Excel user interface and use Excel commands. • Understand how to insert, delete, and adjust cells, column and rows. • Learn how to apply conditional formatting and work with ranges and charts. • Discover how to sort, filter and query data with database functions. • Understand how to create and modify tables, use lookup functions and apply data validation.			
Paper I			
1	Data Entry and Autofill Function		
2	Graphs and Diagrams		
3	Mathematical Functions Using MS-Excel		
4	Sort and Filter		
5	Tabulation using Pivot charts		
6	If and Text functions		

Course Code	MAJOR SEM – II	Credits	Lectures /Week
K24USSTATMJ211	Paper I - Statistical Methods – II	2	2
Course Outcomes: After successful completion of this course, students would be able to • Describe the importance and application of normal distribution. • Describe the problem of statistical inference. • Explain and recognize continuous random variable. • Apply the theoretical continuous probability distributions like Normal, Exponential, etc., in the relevant application areas. • Apply and interpret the central limit theorem for means. • Compute and interpret Confidence Intervals.			
Unit	Topics	No of Lectures	
I	Continuous random variable and Some Standard Continuous Distributions - Concept of Continuous random variable and properties of its probability distribution. - Probability density function and cumulative distribution function. Their graphical representation. - Expectation of a random variable and its properties. - Measures of location, dispersion, skewness and kurtosis. - Raw and central moments (simple illustrations). - Uniform, Exponential (location scale parameter), Derivations of mean and variance.	15	

	Continuous bivariate random variables: a) Joint Probability density function and its properties b) Distribution function of (X,Y) and its properties c) Definition of raw and central moments, covariance, correlation coefficient, d) Independence and correlation between two variables e) Marginal and conditional probability distributions f) Conditional expectation, conditional variance.	
II	Normal distribution and Elementary topics on Estimation a) Normal distribution, Properties of Normal distribution (without proof). b) Normal approximation to Binomial and Poisson distribution (statement only). Properties of Normal curve. Use of normal tables. c) Sample from a distribution, Concept of a statistic, estimate and its sampling distribution. Parameter and its estimator. d) Concept of bias and standard error of an estimator. e) Central Limit theorem (statement only). f) Sampling distribution of sample means and sample proportion. (For large sample only). g) Standard errors of sample mean and sample proportion. h) Point and Interval estimate of single mean, single proportion from sample of large size.	15

Textbooks:

- Gholba-Phatak: Statistical Methods, Vipul Prakashan.
- Welling-Khandeparkar: Statistical Methods, Manan Prakashan.
- Dr. Kore B. G. and Dr. Dixit P. G.: “Elementary Probability Theory”, Nirali Prakashan, Pune.

Additional References:

- Rohatgi V. K. and Saleh A. K. Md. E. (2002): An introduction to probability and statistics, John Wiley and Sons.
- Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill.
- Hogg, R. V., Tanis, E.A. and Rao J.M.: Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.

Course Code	SEM II	Credits	Lectures/ Week
K24USSTATMJP21	Practical - II	2	4
Course Outcomes: After successful completion of this course, students would be able to: • Compute correlation coefficient, interpret its value. • Compute regression coefficient, interpret its value. • Compute the index numbers. • Find various measures of continuous random variable and probabilities using its probability distribution. • Compute probabilities of standard continuous probability distributions. • Know some standard continuous probability distributions with real life situations.			
Paper I			
1	Correlation analysis - I		
2	Correlation analysis - II		
3	Regression analysis - I		
4	Regression analysis - II		
5	Fitting of curve		
6	Time series		
7	Index numbers		
8	Continuous Random Variables		
9	Continuous Bivariate Random Variables		
10	Uniform and Exponential Distribution		
11	Normal Distribution		
12	Applications of central limit theorem and normal approximation		
13	Estimation		

Course Code	OPEN ELECTIVE SEM – II	Credits	Lectures /Week
K24USSTATOE241	Paper I - Introduction to Statistics-I	2	2
Course Outcomes: After successful completion of this course, students would be able to • (Describe the basic terminology of sampling and its methods. • Understand different data types and the skill of handling data. • Summarize quantitative and qualitative data. • Apply measures of central tendency, measures of dispersion and location to the data. • Visualize data graphically.			
Unit	Topics	No of Lectures	
I	Elementary Data processing and Graphing techniques: - Definition of Statistics. - Types of Characteristics. - Methods of data collection: - Primary data: concept of questionnaire and a schedule. - Secondary data. - Types of data: Qualitative and quantitative data: Time series data and cross section data, discrete and continuous data. - Tabulation. - Univariate frequency distribution of discrete and continuous variables. - Graphical representation of frequency distribution by Histogram, frequency curve. - Diagrammatic representation using bar diagrams and pie chart.	15	

II	Measures of central tendency a) Concept of central tendency of data. b) Locational averages: Median, Mode. c) Mathematical averages: Arithmetic mean. d) Merits and demerits of using different measures & their applicability. e) Estimating Mode from graph.	15
Textbooks: • Gholba-Phatak-Jardosh: Descriptive Statistics, Vipul Prakashan. • Welling-Khandeparkar: Descriptive Statistics, Manan Prakashan. • Dr. Kore B G. and Dr. Dixit P. G.: Descriptive Statistics I, Nirali Prakashan, Pune. Additional References: • Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand • Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics • Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.		

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures /Week
K24USSTATVC241	Paper I - Optimization Models using Excel	2	2
Course Outcomes: After successful completion of this course, students would be able to • Formulate and solve a linear programming problem graphically and using simplex method. • Obtain dual of a given problem and solve the primal from the optimum solution of a primal. • Solve a transportation problem and its variants using various methods and optimize it. • Solve an assignment problem and its variants using Hungarian.			
Paper I			
1	Linear Programming Problem:- Graphical Method		
2	Linear Programming Problem:- Simplex method		
3	Transportation Problem		
4	Assignment Problem		
5	Optimization Models using Excel		

Course Code	SKILL ENHANCEMENT COURSE SEM – II	Credits	Lectures/ Week
K24USSTATSE251	Paper I – Statistics using MS-Excel	2	2
Course Outcomes: After successful completion of this course, students would be able to • Create different charts/diagrams using MS-Excel. • Edit chart area, titles, size. • Calculate measures of central tendency and measures of dispersion for the given data. • Compute probabilities of some standard discrete distributions.			
Paper I			
1	Graphical representation using MS Excel		
2	Tabulation using MS Excel		
3	Measures of Central Tendency		
4	Measures of Dispersion		
5	Discrete probability distributions		
6	Continuous probability distributions		

Evaluation Scheme for First Year (UG) under NEP (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment(CIA) Assignment - Tutorial/ Case Study/ Project / Presentations/ Group Discussion / Ind. Visit. – 10 marks

2) Continuous Internal Assessment(CIA) ONLINE Unit Test – 10 marks

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hours

Theory question paper pattern: All questions are compulsory.

Question	Based on	Marks
Q.1	Unit I	15
Q.2	Unit II	15

- All questions shall be compulsory with internal choice within the questions.
- Each Question may be sub-divided into sub questions as a, b, c, d, etc. & the allocation of Marks depends on the weightage of the topic.

III. Practical Examination

- Each core subject carries 50 Marks.
- Duration: 2 Hours for each practical course.
- Minimum 80% practical from each core subjects are required to be completed.
- Certified Journal is compulsory for appearing at the time of Practical Exam

NOTE: To pass the examination, attendance is compulsory in both Internal & External (Theory + Practical) Examinations.