

Deccan Education Society's

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

Dadar (W), Mumbai -28



Affiliated to

UNIVERSITY OF MUMBAI

Title of the program

- A- U.G. Certificate in Statistics**
- B- U.G. Diploma in Statistics**
- C- B.Sc. (Statistics)**

Syllabus for

Semester – Sem I & II

Ref: GR dated 20th April, 2023 for Credit Structure of UG

(With effect from the academic year 2026-27 Progressively)

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.

PROGRAM SPECIFIC OUTCOMES

PSO	Description
PSO1	Understand basic concepts of statistics, data collection, classification, and presentation.
PSO 2	Develop skills to represent data using tables, charts, and graphs for better interpretation.
PSO 3	Apply concepts of probability, distributions, and inferential statistics in solving practical problems.
PSO 4	Build a strong foundation for advanced statistical concepts and further studies.



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Sr. No.	Heading	Particulars	
1	Title of program O: _____A	A	U.G. Certificate in Statistics
	O: _____B	B	U.G. Diploma in Statistics
	O: _____C	C	B.Sc. (Statistics)
2	Eligibility O: _____A	A	HSC(Science) OR Passed Equivalent Academic Level 4.0
	O: _____B	B	Under Graduate Certificate in Statistics OR Passed Equivalent Academic Level 4.5
	O: _____C	C	Under Graduate Diploma in Statistics OR Passed Equivalent Academic Level 5.0
3	Duration of program R: _____	A	One Year
		B	Two Years
		C	Three Years
4	Intake Capacity R: _____	120	

Sign of the HOD &
Coordinator
BOS in Statistics

Sign of the NEP Coordinator,
DES's Kirti M. Doongursee
College

Sign of Principal
DES's Kirti M.
Doongursee College,
Mumbai 28.

Preamble

1) Introduction:

The First Year B.Sc. Statistics syllabus provides a foundation in basic statistical concepts and data handling techniques. It introduces students to data collection, classification, tabulation, and graphical representation. The course also covers fundamental ideas of central tendency, probability, and basic distributions. It helps students develop logical thinking and prepares them for advanced statistical studies.

2) Aims and Objectives:

- To introduce basic concepts of statistics and data analysis.
- To develop understanding of data presentation through tables, charts, and graphs.
- To build skills in calculating and interpreting statistical measures.
- To provide a foundation in probability and its applications.
- To prepare students for higher-level statistical learning.

3) Learning Outcomes:

After completion of the course, students will be able to:

- Understand and explain basic statistical concepts and methods.
- Organize and present data using tables, diagrams, and graphs.
- Calculate and interpret measures of central tendency and basic probability.
- Apply statistical techniques to solve simple real-life problems.
- Develop analytical and problem-solving skills.

Semester	Course Code	Course Title	Vertical	Credit
I	26STAMJ111	Statistical Methods - I	Major	2
	26STAMJP11	Major Practical - I	Practical	2
	26STAOE131	Introduction to Statistics-I	OE1	2
	26STAVC141	Elementary To Advanced Excel	VSC	2
	26STASE151	Introduction To Excel	SEC	2
II	26STAMJ211	Statistical Methods - II	Major	2
	26STAMJP21	Major Practical - II	Practical	2
	26STAOE231	Introduction to Statistics-II	OE2	2
	26STAVC241	Fundamentals of SQL & Database Management	VSC	2
	26STASE251	Statistics Using MS-Excel	SEC	2

Course Code	MAJOR SEM – I	Credits	Lectures/ Week
26STAMJ111	Statistical Methods– I	2	2

Course Objectives(CO):

CO1: Provide fundamental understanding of probability concepts such as sample space, events, random variables, and probability distributions.

CO2: Develop knowledge of probability theorems, discrete distributions, moments, and bivariate distributions.

CO3: Enable students to apply probability concepts and statistical measures to solve real-life problems and compute probabilities.

CO4: Build analytical ability to interpret relationships between random variables using conditional probability, independence, covariance, and correlation.

Course Outcomes (OC):

OC1. Recall fundamental concepts of probability, including sample space, events, probability distributions, and moments, as well as definitions and properties of discrete random variables.

OC2. Explain probability theorems, including addition, multiplication theorem on probability, along with the properties of standard discrete distributions, moments, and bivariate distributions.

OC3. Apply probability concepts and Bayes' theorem to solve real world problems, compute mean, variance, and moments for discrete distributions, and calculate probabilities for joint, marginal, and conditional distributions.

OC4. Evaluate the impact of conditional probability and independence on real-world scenarios, and interpret relationships between random variables using measures like covariance, correlation, and joint probability distributions.

Unit	Topics	No of Lectures
I	Elementary Probability Theory a) Trial, random experiment, sample point and sample space. b) Definition of an event. Operation of events, mutually exclusive and exhaustive events. c) Classical (Mathematical) and Empirical definitions of Probability and their properties. d) Theorems on Addition and Multiplication of probabilities. e) Independence of events, pairwise and mutual independence for three event, Conditional probability. f) Bayes theorem and its applications.	15

II	Discrete Random Variable and Some Standard Discrete Distributions a) Random variable. Definition and properties of probability distribution and cumulative distribution function of discrete random 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.	15
Textbooks: 1. Gholba-Phatak: Statistical Methods, Vipul Prakashan. 2. Welling-Khandeparkar: Statistical Methods, Manan Prakashan. 3. Dr. Kore B. G. and Dr. Dixit P. G.: "Elementary Probability Theory", Nirali Prakashan, Pune. Additional References: 1. Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand. 2. Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill. 3. 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
26STAMJP11	Major Practical - I	2	4

Course Objectives (CO):

CO1: Introduce students to methods of data presentation using tables, graphs, and diagrams, and basic statistical concepts.

CO2: Develop understanding of statistical measures and their interpretation in analyzing numerical data and real-life situations.

CO3: Enable students to apply statistical techniques such as central tendency, dispersion, and probability to solve numerical problems.

CO4: Enhance analytical skills to examine variability, relationships, and dependencies in data using correlation and bivariate distributions.

Course Outcomes (OC):

OC1: Recall the steps for constructing tables, graphs, and diagrams, and the formulas for measures of central tendency, dispersion, probability, and discrete distributions to set up numerical problems.

OC2: Explain the significance of numerical solutions obtained from tabulation, graphs, and statistical measures. Interpret the role of probability and random variables in solving real-world scenarios numerically.

OC3: Apply statistical methods to solve numerical problems, such as constructing frequency tables, calculating measures of central tendency and dispersion, and computing probabilities for discrete random variables and distributions.

OC4: Analyze numerical data by interpreting variability and relationships through measures like standard deviation and correlation. Solve advanced problems involving discrete bivariate distributions and evaluate dependencies or independence between variables using joint probabilities.

Practical No.	Title	No. of lectures
1	Tabulation	60
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	

Textbooks:

1. Gholba-Phatak-Jardosh: Descriptive Statistics, Vipul Prakashan.
2. Welling-Khandeparkar: Descriptive Statistics, Manan Prakashan.
3. Dr. Kore B G. and Dr. Dixit P. G.: Descriptive Statistics I, Nirali Prakashan, Pune.
4. Gholba-Phatak: Statistical Methods, Vipul Prakashan.
5. Welling-Khandeparkar: Statistical Methods, Manan Prakashan.
6. Dr. Kore B. G. and Dr. Dixit P. G.: "Elementary Probability Theory", Nirali Prakashan, Pune.

References:

1. Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand.
2. Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill.
3. Hogg, R. V., Tanis, E.A. and Rao J.M.: Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.
4. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics
5. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.

Course Code	OPEN ELECTIVE SEM- I	Credits	Lectures/ Week
26STAOE131	Introduction to Statistics-I	2	2

Course Objectives(CO):

CO1: Familiarize students with fundamental concepts of statistics, including types of data, data collection methods, and measures of central tendency.

CO2: Build understanding of tabulation, frequency distributions, and graphical representation of data.

CO3: Equip students with skills to construct tables, graphs, and compute statistical measures.

CO4: Strengthen the ability to select appropriate methods for data representation and assess the suitability of statistical measures in different contexts.

Course Outcomes (OC):

OC1. Define key concepts of statistics, including the types of characteristics, methods of data collection, and types of data, the concept of central tendency and basic measures like median, mode, and arithmetic mean.

OC2. Explain the construction of tabulation and univariate frequency distributions for discrete and continuous data. Illustrate the graphical and diagrammatic representation of data using histograms, frequency curves, bar diagrams, and pie charts. Describe the significance of central tendency and compare the merits and demerits of median, mode, and arithmetic mean.

OC3. Demonstrate the ability to create and interpret tabulations, frequency distributions, and graphical representations. Calculate measures of central tendency such as median, mode, and arithmetic mean, and estimate the mode using graphical methods.

OC4. Examine datasets to analyze the suitability of different graphical and tabular methods for representation. Assess the relevance and effectiveness of various measures of central tendency for summarizing data, evaluating their applicability based on dataset characteristics.

Unit	Topics	No of Lectures
I	Elementary Data processing and Graphing techniques: a) Definition of Statistics. b) Types of Characteristics. c) Methods of data collection: (i) Primary data: concept of questionnaire and a schedule. (ii) Secondary data. d) Types of data: Qualitative and quantitative data: Time series data and cross section data, discrete and continuous data. e) Tabulation. f) Univariate frequency distribution of discrete and	15

	continuous variables. g) Graphical representation of frequency distribution by Histogram, frequency curve. Diagrammatic representation using bar diagrams and pie chart.	
II	Measures of central tendency a) Concept of central tendency of data. b) Mathematical averages: Arithmetic mean. c) Locational averages: Median, Mode. d) Merits and demerits of using different measures & their applicability. e) Estimating Mode from graph.	15
Textbooks: 1. Gholba-Phatak-Jardosh: Descriptive Statistics, Vipul Prakashan. 2. Welling-Khandeparkar: Descriptive Statistics, Manan Prakashan. 3. Dr. Kore B G. and Dr. Dixit P. G.: Descriptive Statistics I, Nirali Prakashan, Pune. Additional References: 1. Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand 2. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics 3. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.		

Course Code	VOCATIONAL SKILL COURSE SEM – I	Credits	Lectures/Week
26STAVC141	Paper I - Elementary To Advanced Excel	2	4

Course Objectives (CO):

CO1: Familiarize students with basic Excel operations such as formatting, data entry, autofill, and graphical representation of data.

CO2: Develop understanding of data organization techniques using sorting, filtering, pivot charts, and conditional formatting.

CO3: Enable students to use Excel functions including mathematical, logical, text, date, and lookup functions for problem-solving.

CO4: Strengthen the ability to manage and analyze datasets using advanced Excel tools to identify patterns and support decision-making.

Course Outcomes (OC):

OC1: Identify and perform basic Excel operations including formatting, data entry, autofill, and creation of graphs and diagrams.

OC2: Explain the use of Excel tools such as sorting, filtering, pivot charts, and conditional formatting for organizing and presenting data effectively.

OC3: Apply Excel functions including mathematical, logical (IF), text (STRING), date functions, and lookup functions (VLOOKUP, HLOOKUP) to solve practical problems.

OC4: Analyze datasets using advanced tools such as pivot charts, conditional functions (COUNTIF, SUMIF, COUNTIFS, SUMIFS), and filtering techniques to derive meaningful insights and patterns.

Practical No.	Title	No. of lectures
1	Basic Formatting	60
2	Data Entry and Autofill Function	
3	Graphs and Diagrams	
4	Sort and Filter	
5	Tabulation using Pivot charts	
6	If Function	
7	Mathematical Functions Using MS-Excel	
8	Conditional Formatting	
9	STRING & DATE Functions	
10	VLOOKUP & HLOOKUP	
11	COUNTIF & COUNTIFS	
12	SUMIF & SUMIFS	

References:

- Paul McFedries and Greg Harvey: Excel All-in-one for Dummies, John Wiley and Sons, Inc.
- George Wahlberg: Excel 2022 From basic to advanced.
- Manisha Nigam: Advanced Analytics with Excel 2019, Second Edition, BPB Publications.

Course Code	SKILL ENHANCEMENT COURSE SEM – I	Credits	Lectures/Week
26STASE151	Paper I – Introduction To Excel	2	4

Course Objectives (CO):

CO1: Define and describe basic MS Excel operations such as data entry, autofill, graph creation, and use of functions.

CO2: Summarize and explain the use of Excel tools like sorting, filtering, pivot charts, and formulas for organizing and presenting data.

CO3: Use Excel features to create tables, graphs, and perform calculations using mathematical and logical functions.

CO4: Examine and interpret datasets using advanced Excel tools to identify patterns, relationships, and trends.

Course Outcomes (OC):

OC1: Identify and describe basic operations of MS Excel, including data entry, autofill, graph creation, and the use of mathematical and text functions.

OC2: Explain the application of Excel tools like sorting, filtering, pivot charts, and formulas to organize, analyze, and represent data.

OC3: Apply Excel functions to create tables, graphs, and pivot charts, perform data sorting and filtering, and solve problems using mathematical and logical formulas such as IF and TEXT functions.

OC4: Analyze datasets by organizing and summarizing information with pivot charts, advanced filtering techniques, and logical functions to identify patterns and trends.

Practical No.	Title	No. of lectures
1	Basic Formatting	60
2	Data Entry and Autofill Function	
3	Working with Data	
4	Customizing Excel	
5	Graphs and Diagrams	
6	Basic Text Functions	
7	Introduction to Cell Referencing	
8	Working with Multiple Sheets	
9	Mathematical Functions Using MS-Excel	
10	Sort and Filter	
11	Tabulation using Pivot charts	
12	If Function	

References:

- Paul McFedries and Greg Harvey: Excel All-in-one for Dummies, John Wiley and Sons, Inc.
- George Wahlberg: Excel 2022 From basic to advanced.
- Manisha Nigam: Advanced Analytics with Excel 2019, Second Edition, BPB Publications.

Course Code	MAJOR SEM – II	Credits	Lectures/ Week
26STAMJ211	Statistical Methods– II	2	2
Course Objectives(CO): CO1: Define and describe key concepts of continuous random variables, their probability distributions, and standard continuous distributions. CO2: Explain probability density functions, cumulative distribution functions, and their graphical representations, along with expectations and properties. CO3: Use properties of Normal distribution and its approximations to Binomial and Poisson distributions, and compute estimators, sampling distributions, and standard errors. CO4: Obtain joint, marginal, and conditional distributions of continuous bivariate random variables and interpret relationships using covariance and correlation.			
Course Outcomes (OC): OC1. Identify and describe the key concepts related to continuous random variables, their probability distributions, and the properties of standard continuous distributions OC2. Understand and explain the probability density function, cumulative distribution function, and their graphical representations, along with the expectation and properties of continuous random variables. OC3. Apply the properties of the Normal distribution and its approximation to Binomial and Poisson distributions, and calculate estimators, sampling distributions, and standard errors for large samples. OC4. Analyze continuous bivariate random variables, including joint probability density functions, marginal and conditional distributions, covariance, and correlation, to understand the relationships between two variables.			
Unit	Topics	No of Lectures	
I	Continuous random variable and Some Standard Continuous Distributions a) Concept of Continuous random variable and properties of its probability distribution. b) Probability density function and cumulative distribution function. Their graphical representation. c) Expectation of a random variable and its properties. d) Measures of location, dispersion, skewness and kurtosis. e) Raw and central moments (simple illustrations). f) Uniform, Exponential (location scale parameter), Derivations of mean and variance.	15	

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

- 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 II	Credits	Lectures/Week
26STAMJP21	Major Practical - II	2	4

Course Objectives (CO):

CO1: Define and describe the basic principles of correlation and regression analysis for studying relationships between variables.

CO2: Explain methods of curve fitting, time series analysis, and index numbers for identifying trends and patterns in data.

CO3: Apply concepts of continuous random variables and their distributions to compute probability, expectation, and variance.

CO4: Evaluate continuous bivariate random variables and apply the central limit theorem and normal approximation for data analysis and parameter estimation.

Course Outcomes (OC):

OC1: Recognize and define the core principles of correlation analysis and regression analysis, including the interpretation of correlation coefficients and regression models to explore relationships between variables.

OC2: Explain the techniques of curve fitting, time series analysis, and index numbers, demonstrating how these methods can be used to model trends, forecast future values, and interpret patterns in data.

OC3: Utilize the concepts of continuous random variables and their corresponding distributions (uniform, exponential, and normal), and calculate their key properties such as probability, expectation, and variance for problem-solving.

OC4: Assess and evaluate continuous bivariate random variables, applying the central limit theorem and normal approximation to estimate parameters and analyze data through advanced statistical methods.

Practical No.	Title	No. of lectures
1	Correlation analysis - I	60
2	Correlation analysis - II	
3	Regression analysis - I	
4	Regression analysis - II	
5	Fitting of curve	
6	Index numbers	
7	Continuous Random Variables	
8	Continuous Bivariate Random Variables	
9	Uniform Distribution	
10	Exponential Distribution	
11	Normal Distribution	
12	Applications of central limit theorem and normal approximation	

Textbooks:

1. Gholba-Phatak-Jardosh: Descriptive Statistics, Vipul Prakashan.
2. Welling-Khandeparkar: Descriptive Statistics, Manan Prakashan.
3. Dr. Kore B G. and Dr. Dixit P. G.: Descriptive Statistics I, Nirali Prakashan, Pune.
4. Gholba-Phatak: Statistical Methods, Vipul Prakashan.
5. Welling-Khandeparkar: Statistical Methods, Manan Prakashan.
6. Dr. Kore B. G. and Dr. Dixit P. G.: “Elementary Probability Theory”, Nirali Prakashan, Pune.

References:

1. Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand.
2. Mood A. M., Graybill F. A. and Boes D. C.: Introduction to the Theory of Statistics, McGraw Hill.
3. Hogg, R. V., Tanis, E.A. and Rao J.M.: Probability and Statistical Inference, Seventh Edition, Pearson Education, New Delhi.
4. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics
5. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.

Course Code	OPEN ELECTIVE SEM II	Credits	Lectures/ Week
26STAOE231	Introduction to Statistics-II	2	2

Course Objectives(CO):

CO1: Provide fundamental understanding of probability concepts such as sample space, events, random variables, and probability distributions.

CO2: Develop knowledge of probability theorems, discrete distributions, moments, and bivariate distributions.

CO3: Enable students to apply probability concepts and statistical measures to solve real-life problems and compute probabilities.

CO4: Build analytical ability to interpret relationships between random variables using conditional probability, independence, covariance, and correlation.

Course Outcomes (OC):

OC1. Recall fundamental concepts of probability, including sample space, events, probability distributions, and moments, as well as definitions and properties of discrete random variables.

OC2. Explain probability theorems, including addition, multiplication theorem on probability, along with the properties of standard discrete distributions, moments, and bivariate distributions.

OC3. Apply probability concepts and Bayes' theorem to solve real world problems, compute mean, variance, and moments for discrete distributions, and calculate probabilities for joint, marginal, and conditional distributions.

OC4. Evaluate the impact of conditional probability and independence on real-world scenarios, and interpret relationships between random variables using measures like covariance, correlation, and joint probability distributions.

Unit	Topics	No of Lectures
I	Probability a) Trial, random experiment, sample point and sample space. b) Definition of an event. Operation of events, mutually exclusive and exhaustive events. c) Classical (Mathematical) definitions of Probability and their properties. d) Theorems on Addition and Multiplication of probabilities. e) Conditional probability. f) Bayes theorem and its applications.	15

II	Univariate & Bivariate Discrete Random Variable a) Definition of Random variable and Discrete random variable b) Definition and properties of probability distribution and cumulative distribution function of discrete random variable. c) Expectation of a random variable. Theorems on Expectation & Variance. d) Joint Probability mass function and its properties e) Distribution function of (X,Y) and its properties f) Independence and correlation between two variables g) Marginal and conditional probability distributions h) Conditional expectation, conditional variance.	15
Textbooks: 1. Gholba-Phatak-Jardosh: Descriptive Statistics, Vipul Prakashan. 2. Welling-Khandeparkar: Descriptive Statistics, Manan Prakashan. 3. Dr. Kore B G. and Dr. Dixit P. G.: Descriptive Statistics I, Nirali Prakashan, Pune. Additional References: 1. Gupta V. K. & Kapoor S. C.: Fundamentals of Mathematical Statistics, Sultan & Chand 2. Hogg R. V. and Crag R. G.: Introduction to Mathematical Statistics 3. Gupta S. P. (2002): Statistical Methods, Sultan Chand and Sons, New Delhi.		

Course Code	VOCATIONAL SKILL COURSE SEM – II	Credits	Lectures/Week
26STAVC241	Paper I - Fundamentals of SQL and Database Management	2	4

Course Objectives (CO):

CO1: Introduce students to basic database concepts and SQL commands for creating and managing tables.

CO2: Develop understanding of data manipulation and retrieval using SQL queries.

CO3: Train students to use SQL functions and tools for organizing and analyzing data.

CO4: Build skills to work with multiple tables and apply advanced query techniques for problem-solving.

Course Outcomes (OC):

OC1: Identify and use basic SQL commands for creating databases, tables, and inserting data.

OC2: Explain and apply SQL queries to retrieve, filter, sort, update, and delete data.

OC3: Apply aggregate functions, grouping, and subqueries to analyze data effectively.

OC4: Analyze and manage relational data using joins, constraints, and functions to solve practical problems.

Practical No.	Title	No. of lectures
1	Database and Table Creation using SQL	60
2	Data Insertion into Tables using SQL Commands	
3	Basic Data Retrieval using SELECT Statement	
4	Data Filtering using WHERE Clause and Operators	
5	Sorting and Removing Duplicates using ORDER BY and DISTINCT	
6	Updating and Deleting Records in Tables	
7	Application of Aggregate Functions in SQL	
8	Grouping and Filtering Data using GROUP BY and HAVING	
9	Performing Join Operations on Multiple Tables	
10	Using Subqueries for Data Retrieval	
11	Working with String and Date Functions	
12	Implementation of Constraints in SQL Tables	

References:

- Mansi J. Dave and Haresh R. Parmar: *Structured Query Language (SQL) for Beginners*, Xoffencer International Publication.
- Sayak Ghosh: *Fundamentals of SQL*, Innovative Publication.
- Jagdish Chandra Patni: *A Comprehensive Study of SQL: Practice and Implementation*, CRC Press.
- Anthony DeBarros: *Practical SQL: A Beginner's Guide to Storytelling with Data*, No Starch Press.

Course Code	SKILL ENHANCEMENT COURSE SEM – II	Credits	Lectures/Week
26STASE251	Paper I – Statistics Using MS-Excel	2	4

Course Objectives (CO):

CO1: Introduce students to the use of MS Excel for tabulation and graphical representation of statistical data.

CO2: Develop understanding of statistical measures such as central tendency and dispersion using Excel.

CO3: Enable students to perform correlation, regression, and curve fitting analysis using Excel tools.

CO4: Build skills to work with discrete and continuous probability distributions for data analysis using Excel.

Course Outcomes (OC):

OC1: Identify and organize data using tabulation and represent it through appropriate graphs in Excel.

OC2: Explain and compute measures of central tendency and dispersion using Excel functions.

OC3: Apply Excel tools to perform correlation, regression, and curve fitting for analyzing relationships in data.

OC4: Compute probabilities using discrete and continuous probability distributions in Excel.

Practical No.	Title	No. of lectures
1	Tabulation using MS Excel	60
2	Graphical representation using MS Excel	
3	Measures of Central Tendency-I	
4	Measures of Central Tendency-II	
5	Measures of Dispersion-I	
6	Measures of Dispersion-II	
7	Correlation analysis-I	
8	Correlation analysis-II	
9	Regression analysis	
10	Fitting of curves	
11	Discrete probability distributions	
12	Continuous probability distributions	

References:

- Dalgaard, Peter: Introductory Statistics with R, Springer.
- Wickham, Hadley & Grolemund, Garrett: R for Data Science, O'Reilly Media.
- Verzani, John: Using R for Introductory Statistics, CRC Press.
- Crawley, Michael J.: The R Book, Wiley.
- Bruce, Peter, Bruce, Andrew, & Gedeck, Peter: Practical Statistics for Data Scientists: 50 Essential Concepts with R and Python, O'Reilly Media.

Evaluation Scheme for First Year B.Sc. Statistics (UG)
under NEP 2020 (2 credits)

I. Internal Evaluation for Theory Courses – 20 Marks

1) Continuous Internal Assessment (CIA) Assignment - 10 marks

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

II. External Examination for Theory Courses – 30 Marks

Duration: 1 Hour

Theory question paper pattern:

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.

**NOTE: To pass the examination, attendance is compulsory in both
Internal & External Theory Examinations.**

First Year B.Sc. Statistics Evaluation pattern and Question paper pattern for Semester End Practical Examination of Major Course

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Viva/ assignment/ objective question test /Small experiments (15 Marks), Overall performance (5 Marks) = 20 Marks	As per paper pattern	1 hr 30 mins

First Year B.Sc. Statistics Evaluation pattern and Question paper pattern for Semester End Practical Examination of Vocational Skill Courses and Skill Enhancement Courses

Internal Continuous Assessment: 40% (20 Marks)	Semester End Examination: 60% (30 Marks)	Duration for End semester examination
Viva/ assignment/ objective question test /Small experiments (15 Marks), Overall performance (5 Marks) = 20 Marks	As per paper pattern	1 hr 30 mins

Signatures of Team Members

SR. No.	Name	Signature
1.	Dr. Manoj Kumar Mishra	
2.	Dr. Dharmendra Kumar Yadav	
3.	Prof. Deepa Kulkarni	
4.	Mr. Amiit K. Naik	
5.	Mr. Swapnil D. Kadam	
3.	Dr. Smita R. Patgaonkar	
7.	Ms. Sonali M. Thik	
8.	Ms. Sneha R. Govilkar	

Letter Grades and Grade Points:

Semester GPA/ Programme CGPA Semester/ Programme	% of Marks	Alpha-Sign/ Letter Grade Result	Grading Point
9.00 - 10.00	90.0 - 100	O (Outstanding)	10
8.00 - < 9.00	80.0 - < 90.0	A+ (Excellent)	9
7.00 - < 8.00	70.0 - < 80.0	A (Very Good)	8
6.00 - < 7.00	60.0 - < 70.0	B+ (Good)	7
5.50 - < 6.00	55.0 - < 60.0	B (Above Average)	6
5.00 - < 5.50	50.0 - < 55.0	C (Average)	5
4.00 - < 5.00	40.0 - < 50.0	P (Pass)	4
Below 4.00	Below 40.0	F (Fail)	0
Ab (Absent)	-	Ab (Absent)	0

Justification for Bachelors in Statistics

1.	Necessity for starting the course:	Statistics plays a vital role in data analysis, decision-making, and research across various fields such as business, healthcare, economics, and social sciences. With the growing importance of data-driven approaches, there is a strong demand for statistical knowledge and skills. The course helps students develop analytical thinking and prepares them for careers in data-related fields.
2.	Whether the UGC has recommended the course:	Yes
3.	Whether all the courses have commenced from the academic year 2023-26.	The course has already commenced in the university and in the academic year 2023-26 it is restructured under NEP 2020
4.	The courses started by the University are self-financed, whether adequate number of eligible permanent faculties are available?:	This course is aided based on the sanction given by University of Mumbai to affiliated colleges time to time.
5.	To give details regarding the duration of the Course and is it possible to compress the course?:	The duration of the program is three years (6 semesters). It is not possible to compress the course.
6.	The intake capacity of each course and no. of admissions given in the current academic year:	120 per division
7.	Opportunities of Employability / Employment available after undertaking these courses:	Graduates in Statistics have wide career opportunities in fields such as data analysis, banking, insurance, market research, healthcare, and government sectors. They can work as data analysts, statisticians, research assistants, and quality analysts. The course also provides a strong foundation for higher studies in statistics, data science, actuarial science, and related areas.