

Academic Year: 2025-26
Subject - Statistics

Annual Teaching Plan

B.Sc. Part-I

Semester I

Department -Statistics

Course -2DSC03STA11

DSC-I Descriptive Statistics I

Name of teacher – Bhosale Ashok B.

			Module/ Unit	Sub Unit Planned
Month June -July				
Lectures 09	Practicals -	Total 09	Unit-1 Introduction to Statistics & Measures of Central Tendency	1.Definition and scope of Statistics, raw data, primary and secondary data. 2. Qualitative and Quantitative data, discrete and continuous variables. 3.Concept and Requirements of good statistical average. 4.Arithmetic Mean , : Definition and Properties
Month: August				
Lectures 09	Practicals	Total 09	Unit-1 Introduction to Statistics & Measures of Central Tendency	1.Geometric Mean, Harmonic Mean: Definition and Properties 3.Median, Mode: Definition and Derivation of formula 4. Empirical relation, Graphical method of determination of Median and Mode. 5.Partition values, Box Plot. 6.Comparison between averages, Situations.
Month: September				
Lectures 07	Practicals	Total 07	Unit-2 Measures of Dispersion	1.Concept of dispersion, types and requirements of a good measure of dispersion. 2.Different Absolute and relative measures: definition ,properties , merits and demerits. 8. Raw moments and Central moments (μ_r) for ungrouped and grouped data. Effect of change of origin and scale on central moments, relation between central moments and raw moments. Sheppard's corrections.
Month: October-November				
Lectures 08	Practicals	Total 08	Unit-4 Theory of Attributes	1. Concept, Types of skewness, Bowley's, Karl Pearson's coefficient of skewness, and Measure based on moments. 2. Concept, Types and Measure of kurtosis based on moments,

Name & Signature of Teacher

(Mr. A. B. Bhosale)



Mrs. V. C. Shinde
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DEPARTMENT OF STATISTICS
VIVEKANAND COLLEGE, KOLHAPUR
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Annual Teaching Plan

Academic year 2025- 2026

Semester I

Department -Statistics

Subject - Statistics

Course code - DSC II -2DSC03STA12

Course Title: **ELEMENTARY PROBABILITY THEORY**

Name of teacher – Mrs. Shinde V. C.

Month: July			Module/Unit	Sub-units planned
Lectures 09	Practicals 08	Total 17	Unit-1 Probability	1. Concepts of experiments and random experiments. 2. Definitions: Sample space, Event, Types of events 3. Algebra of events 4. Power set 5. Symbolic representation of given events and Illustrative examples.
Month: August				
Lectures 08	Practicals 16	Total 24	Unit-1 Probability	1. Apriori definition of probability, Probability model 2. Axiomatic definition of probability 3. Illustrative examples 4. Definition of probability in terms of odd ratio 5. Some theorems on probability 6. Examples.
Month: September				
Lectures 10	Practicals 16	Total 26	Unit-2 Independence of Event & Mathematical Expectation of discrete random variable (on finite sample space)	1. Definition of conditional probability, Multiplication theorem of probability 2. Baye's theorem, examples on conditional probability and Baye's theorem 3. Independence of two events, Pairwise and Mutual Independence for three events. Elementary examples. 4. Concept of Independence of two events. 5. Theorems on independence of events.
Month: October				
Lectures 07	Practicals 08	Total 15	Unit-3 Independence of Event & Mathematical Expectation of discrete random variable (on finite sample space)	1. Definition of discrete random variable, Probability mass function (p.m.f.) and cumulative distribution function (c.d.f.) 2. of a discrete random variable, Properties of c.d.f 3. Probability distribution of function of random variable, 4. Median and Mode of a univariate discrete probability distribution. 5. Raw moments & central moments, pgf, effect of change of origin and scale on pgf.

Name & signature of teacher

Mrs. V.C. Shinde.



Mrs. V.C. Shinde.

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Academic year 2025-2026

Semester II

Department -Statistics

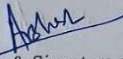
Subject - Statistics

Course 2DSC03STA21 Title - Descriptive Statistics-II

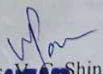
Title: Descriptive Statistics-II

Name of teacher – Bhosale A.B.

			Module/Unit	Sub-units planned
December-January				
Lectures	Practicals	Total	Unit-1: Analysis of Bivariate Data	1. Bivariate random variable 2. Correlation & types 3. Scatter diagram 4. Karl Pearson coefficient 5. Spearman rank correlation 6. Numerical examples
12	0	12		
Month- February				
Lectures	Practicals	Total	Unit-1: Analysis of Bivariate Data	1. Concept of regression and line of regression 2. derivation of equations of Regression lines 3. Regression coefficients & properties. 4. Angle between two regression Lines 5. Numerical examples
09	0	09		
Month- March				
Lectures	Practicals	Total	Unit-2: Theory of Attributes & Demography	1. Meaning & Definition of Attribute 2. Basic terminology 3. Concept and conditions of consistency 4. Independence & association 5. Q and Y 6. Relation between Q & Y 7. Examples and problems
8	0	08		
			Unit-4	
Month- April				
Lectures	Practicals	Total	Unit-2: Theory of Attributes & Demography	1. Vital statistics 2. Mortality rates 3. Fertility rate 4. Reproduction rate 5. Examples and problems
6	0	06		


Name & Signature of Teacher
(Bhosale A.B.)




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Annual Teaching Plan

Academic year 2025- 2026

Semester II

Department -Statistics

Subject - Statistics

Course code – DSC IV- 2DSC03STA22

Course Title – **DISCRETE PROBABILITY DISTRIBUTIONS**

Name of teacher – Mrs. V. C. Shinde

Month: November			Module/Unit		Sub-units planned
Lectures 08	Practicals 12	Total 20	Unit-I Discrete Distributions	Standard Probability	1. Idea of one point, two-point distributions and its mean and variance. 2. Discrete Uniform Distribution
Month: December			Module/Unit		Sub-units planned
Lectures 8	Practicals 16	Total 24	Unit-I Discrete Distributions	Standard Probability	1. Discrete Uniform Distribution, Bernoulli Distribution: p.m.f., mean and variance 2. Binomial Distribution 3. Hypergeometric distribution.
Month: January			Module/Unit		Sub-units planned
Lectures 7	Practicals 12	Total 19	Unit-I Discrete Distributions	Standard Probability	1. Poisson Distribution: 2. Poisson distribution as a limiting case of Binomial distribution, examples. 3. Definition of bivariate discrete random variable (X, Y) on finite 4. Joint p.m.f., and c.d.f., Properties of c.d.f. (without proof).
Month: February			Module/Unit		Sub-units planned
Lectures 07	Practicals 12	Total 19	Unit-2 Bivariate Probability Distribution (Defined on finite sample space) & Mathematical Expectation (Bivariate random variable):		1. Computation of probabilities of events in bivariate probability 2. Concepts of marginal and conditional probability distributions, 3. Definition of expectation of functions of r.v. in bivariate distribution. 4. Theorems on expectations
Month: March			Module/Unit		Sub-units planned
Lectures 6	Practicals -	Total 06	Unit-2 Bivariate Probability Distribution (Defined on finite sample space) & Mathematical Expectation (Bivariate random variable):		1. Expectation and variance of linear combination of two discrete r.v.s. 2. Definition of conditional mean, conditional variance, covariance and correlation coefficient, Cov (aX+bY, cX+dY) 3. Distinction between uncorrelated and independent variables. 4. Joint p.g.f, proof of the p.g.f. of sum of two independent r.v.as 5. the product of their p.g.f.

Name & signature of teacher

Mrs. V.C. Shinde



Mrs. V.C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026 Semester III Department -Statistics
 Subject - Statistics Course - DSC-V: 2DSC03STA31 Title -Probability Distributions I

DSC-V: Probability Distributions I

Name of teacher – Ms. Makandar A. M

Month-July			Module/Unit	Sub-units planned
Lectures 9	Practical 16	Total 25	Unit-1 Some Discrete Probability Distributions	1. Geometric Distribution: p.m.f, Mean and Variance, Additive property, Recurrence relation for probabilities, Memory less property, examples. 2. Negative Binomial Distribution: p.m.f. with parameters (k, p), Geometric distribution is a particular case of Negative Binomial distribution, Mean, Variance, p.g.f., Additive property, Recurrence relation for successive probabilities, examples.
Month-August				
Lectures 8	Practical 16	Total 24	Unit-1 Some Discrete Probability Distributions	1. Power series distribution: p.m.f., Mean, Mode, Variance, Binomial, Poisson, Geometric and Negative Binomial distribution as particular cases of power series distribution. 2. Multinomial Distribution: p.m.f., m.g.f, Marginal distribution, Mean, Variance, Covariance, Variance & Covariance matrix, Correlation coefficient, Additive property
Month-September				
Lectures 9	Practical 16	Total 25	Unit -2 Continuous Univariate Distributions	1. Definition of the continuous sample space, 2. Continuous random variable (r.v.), p.d.f., c.d.f. and its properties 3. Expectation of r.v., expectation of function of r.v., mean, median, mode, quartiles, variance, harmonic mean, raw and central moments, skewness and kurtosis. 4. Transformations of continuous univariate random variables
Month- October				
Lectures 10	Practical 8	Total 18	Unit-2 Continuous Bivariate Distributions	1. Definition of bivariate continuous random variable, p.d.f, c.d.f., 2. Expectation, conditional expectation. 3. Transformation of continuous bivariate random variables, Jacobin of transformation.

Name & Signature of Teacher

Ms. A.M. Makandar



Mrs. V. C. Shinde

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Academic year 2025-26
Subject - Statistics

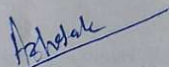
Annual Teaching Plan

B.Sc. Part-II Semester III Department -Statistics
Course - 2DSC03STA32

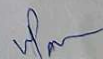
Paper VI - Statistical Methods

Name of teacher – Bhosale Ashok B.

			Module/Unit	Sub-units planned
Month-July				
Lectures 12	Practicals 12	Total 24	Unit-1 Multiple linear Regression, Multiple and Partial Correlation (for trivariate data only)	1. Concept of multiple linear regression, plane of regression, Yule's notation, correlation matrix. 2. Fitting of regression plane by method of least squares, definition of partial regression coefficients and their interpretation. 3. Residual: definition, order of residual, properties, derivation of mean, Variance and Covariance between residuals.
Month-August-September				
Lectures 10	Practicals 20	Total 30	Unit-1 Multiple linear Regression, Multiple and Partial Correlation (for trivariate data only)	1. Concept, Definition, derivation of formula and Properties of multiple correlations coefficient. 2. Coefficient of multiple determination. 3. Concept of partial correlation, Definition and derivation of formula, properties of partial correlation coefficient
Month- October -November				
Lectures 12	Practicals 16	Total 28	Unit-2 Time Series	Time Series: 1. Meaning, need, components of time series, 2. Additive and Multiplicative model 3. Measurement of trend 4. Measurement of seasonal Variation


Name & Signature of Teacher
(Mr. A. B. Bhosale)




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Annual Teaching Plan

Academic year 2025 -2026

Semester IV

Department -Statistics

Subject - Statistics

Course - DSC-VII: 2DSC03STA41

Title -Probability Distributions II

DSC-VII: Probability Distributions II

Name of teacher – Ms. Makandar A.M.

Month- December			Module/Unit	Sub-units planned
Lectures 6	Practicals 12	Total 18	Unit-1: Uniform, Normal, Exponential distribution	1.Uniform distribution 2.Exponential distribution
Month-January				
Lectures 8	Practicals 16	Total 24	Unit-1: Uniform, Normal, Exponential distribution	1.Normal distribution with parameters μ & σ^2 Standard normal distribution 2 Properties of Normal distribution 3.Numerical examples
Month-February				
Lectures 10	Practicals 12	Total 22	Unit-2: Gamma Distribution, Beta distributions and Exact Sampling Distributions	1. Gamma distribution 2.Beta distribution of 1 st kind 3.Beta distribution of 2 nd kind
Month- March-April				
Lectures 12	Practicals 12	Total 24	Unit-2: Gamma Distribution, Beta distributions and Exact Sampling Distributions	1. Beta distribution of 2 nd kind 2. Chi-Square distribution 3. Student's t- distribution 4. Snedecor's F distribution. 5. Inter relation between t, F and χ^2

Ashyang

Name & Signature of Teacher

Ms. A.M. Makandar



V.C. Shinde

Mrs. V. C. Shinde

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			Module/Unit	Sub-units planned
December-January				
Lectures 10	Practicals 28	Total 38	Unit 1 – Testing of Hypothesis I	1. Definitions: Population, sample, hypothesis and types of hypotheses, Simple & composite hypothesis, One and two tailed tests. 2. Type I & Type II errors, level of significance, p-value, critical region, power of test. 3. Large sample tests: General large sample testing. 4. Large sample test for: $\mu = \mu_0$ and $H_0: \mu_1 = \mu_2$.
Month- February				
Lectures 8	Practicals 28	Total 36	Unit 1 – Testing of Hypothesis I Unit 2 – Testing of Hypothesis II	1. Test for testing $H_0: P_1 = P_2, H_0: P_1 = P_0$. 2. $H_0: \rho = \rho_0$ and $H_0: \rho_1 = \rho_2$ 1.Exact/Small sample tests based on t-distribution: $\mu = \mu_0$ and $H_0: \mu_1 = \mu_2$ paired t test.
Month- March-April				
Lectures 12	Practicals 28	Total 40	Unit 2 – Testing of Hypothesis II	1.Test based on Chi-square distribution: $H_0: \sigma^2 = \sigma_0^2$. 2. Test for goodness of fit. 3. Test for independence of attributes. 4. F-test for testing equality of population variances: $H_0: \sigma_1^2 = \sigma_2^2$.

Name & Signature of Teacher

(Bhosale A. B.)



Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025-2026 Semester III

Department -Statistics

Subject - Statistics

Title - Data Science

Course - 2MIN03STA31

Name of teacher – Patil D.D.

Month-July			Module/Unit	Sub-units planned
Lectures 06	Practicals 16	Total 22	Unit-1 Introduction to Data Science	1. Introduction of Data Science 2. Applications of Data Science in industries 3. Data Science Lifecycle, Roles.
Month-August				
Lectures 08	Practicals 16	Total 24	Unit-1 Exploratory Data Analysis (EDA)	1. Types of Data 2. Data Cleaning, Data Transformation 3. Data Discretization, 4. Data Visualization 5. Handling Missing Values
Month-September				
Lectures 08	Practicals 16	Total 24	Unit-2 Learning Methods	1. Applications of both learning methods 2. Problems solved by each approach 3. Supervised and Unsupervised learning
Month- October				
Lectures 08	Practicals 16	Total 24	Unit-2 Classification Problem Classification Techniques	1. Basics of classification 2. Train-Test Split k-Fold Cross-Validation 3. K-Nearest Neighbor's (KNN) 4. Binary vs. Multi-class classification

Name & Signature of Teacher

(Mr. D. D. Patil)



Mrs. V. C. Shinde

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DEPARTMENT OF STATISTICS
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Annual Teaching Plan

Academic year 2025 -2026

B.Sc. II

Semester III

Department -Statistics

Subject - Statistics

Title: Foundation of Inference & Testing

Course: 2MIN03STA32

Name of teacher – Mr. A. P. Patil

Month-june			Module/Unit	Sub-units planned
Lectures 04	Practicals -	Total 04	Unit-1	1. Normal Distribution: p. d. f., Mean and Variance, 2. Standard Normal Variate: Concept and its p.d.f., 3. Properties of normal curve, 4. Examples to find probabilities for given area under standard normal curve.
Month-July				
Lectures 08	Practicals -	Total 08	Unit-1	1. Basic Terms: Population, Sample, Parameter, Statistic, Estimate and Estimator, Unbiased Estimator, Properties and examples, Standard Error, Sampling distribution of Statistic, Test Statistic, Central Limit Theorem, 2. Hypothesis: Definition and its type.
Month-August				
Lectures 08	Practicals -	Total 08	Unit-1	1. Tests: One and two tailed test, Critical region, type I and type II errors, level of significance, p-value, size & power of test. 2. General procedure of testing of hypothesis.
Month- September				
Lectures 08	Practicals -	Total 08	Unit-2.2	Large Sample Tests: 1. Test for Population Mean: i) Test for testing population mean $H_0: \mu = \mu_0$ ii) Test for testing equality of two population means $H_0: \mu_1 = \mu_2$. 2. Test for Population Proportion: i) Test for testing population proportion $H_0: P = P_0$ ii) Test for testing equality of two population proportions $H_0: P_1 = P_2$.
Month-October				
Lectures 08	Practicals -	Total 08	Unit-2 Non-	Small Sample Tests: Definition of student's t variate i) Test for testing population mean $H_0: \mu = \mu_0$ ii) Test for testing equality of two population means $H_0: \mu_1 = \mu_2$. iii) Paired t test

Name & Signature of Teacher

Mr. Patil Abhilekh P.



Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026

Semester IV

Department -Statistics

Subject - Statistics

Title: 2MIN03STA41

Course: Vital Statistics

Name of teacher – Patil D.D.

Month-December			Module/Unit	Sub-units planned
Lectures 08	Practicals 16	Total 24	Unit-1	1. Definitions of national income 2. Different concept of national income (a) gross national product (GNP) 3. Personal income, disposable income, per capita income 4. national income at market price 5. national income at constant price.
Month-January				
Lectures 09	Practicals 12	Total 21	Unit-1	1. Methods of estimation of national income 2. Importance of national income 3. Personal income, disposable income 4. national income at market price
Month-February				
Lectures 08	Practicals 16	Total 24	Unit-2	1. Meaning and utility of index numbers problems in construction of index numbers. 2. Types of index numbers: price, quantity and value 3. Unweighted and weighted index numbers
Month- March				
Lectures 08	Practicals 16	Total 24	Unit-2	1. Index numbers using Laspeyre's, Paasche's and Fisher's formula 2. Properties of Fisher's index number. 3. Tests of index number: unit test, time reversal test, factor reversal test.
Month- April				
Lectures 04	Practicals 12	Total 16	Unit-2	1. Cost of living index number: 2. Definition, Construction by using (i) Family Budget method (ii) Aggregate expenditure method.

Name & Signature of Teacher

(Mr. D.D. Patil)



Mrs. V. C. Shinde
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DEPARTMENT OF STATISTICS
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Annual Teaching Plan

Academic year 2025 -2026

B.Sc. II

Semester IV

Department -Statistics

Subject - Statistics

Title: Sampling Techniques

Course: 2MIN03STA42

Name of teacher – Mr. A. P. Patil

Month-December			Module/Unit	Sub-units planned
Lectures 08	Practicals -	Total 08	Unit-1 Sampling Survey	1. Advantages and disadvantages of sampling methods 2. Principles of sampling survey, Principal steps in sample survey. 3. Designing a questionnaire, Characteristics of good Questionnaire.
Month-January				
Lectures 08	Practicals -	Total 08	Unit-1 Sampling Survey	4. SRS: Simple random sampling from finite population of size N with replacement (SRSWR) and without replacement (SRSWOR) 5. In SRSWOR, the probability of a specified unit being selected in sample
Month-February				
Lectures 08	Practicals -	Total 08	Unit-2.1 Methods of Sampling	1. In SRSWOR, the probability of drawing a sample of size 'n' from a population of size N units is $1/(Nn)$ 2. In SRSWR, the probability of a specific unit included in the sample is $(1-1/N)n$ 3. statement of unbiased estimator of population means and its variance under SRSWR & SRSWOR
Month- March				
Lectures 08	Practicals -	Total 08	Unit-2.2 Stratified random sampling	1. Definition, Mean and Variance, sample size determination of i^{th} stratum with their allocations.
Month- April				
Lectures 04	Practicals -	Total 04	Unit-2	1. Systematic sampling and Cluster Sampling.

Name & Signature of Teacher

Mr. Patil Abhilash P.



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Annual Teaching Plan

Academic year 2025-2026

Semester V

Department -Statistics

Subject - Statistics

Course Code: DSC03STA51

Course Title -Probability Distributions (Paper -IX)

Name of teacher – Mrs. V. C. Shinde

Month-July			Module/Unit	Sub-units planned
Lectures 8	Practical 16	Total 24	Unit- Univariate and Multivariate Probability Distributions	1.Laplace distribution 2.Lognormal distribution
Month-August				
Lectures 9	Practical 16	Total 25	Unit-1 Univariate and Multivariate Probability Distributions	1.Cauchy distribution 2. Weibull distribution
			Unit-1 Univariate and Multivariate Probability Distributions	1.Logistic distribution 2. Pareto distribution
Month- September				
Lectures 11	Practical 16	Total 27	Unit-2 Truncated Distributions & Bivariate Normal Distribution	Truncated distributions 1.Discrete truncated distributions: Truncated binomial, Poisson & 2. Continuous truncated distributions: exponential distribution (mean, variance & examples) Truncated Normal distribution (Truncated at left $X=a$ truncated to right at $X=b$ truncated to both sides)
Month- October				
Lectures 6	Practical 4	Total 10	Unit-2 Truncated Distributions & Bivariate Normal Distribution	Bivariate Normal Distribution 1.Pdf, Mean, variance m.g.f, 2.marginal distribution 3. conditional distribution, moments 4. Results and examples

Name & Signature of Teacher

Mrs. V. C. Shinde



Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025-26

B.Sc. Part-III

Semester V

Department -Statistics

Subject - Statistics

Course - DSC03STA52

Paper X- Statistical Inference I

Name of teacher – Bhosale Ashok B.

			Module/Unit	Sub-units planned
Month-June -July				
Lectures 12	Practicals 16	Total 28	Unit-1: Point Estimation, Likelihood and Sufficiency	Parameter, Statistic, Estimate Estimator, Properties of Good estimator: Unbiasedness Consistency
Month-August				
Lectures 10	Practicals 12	Total 22	Unit-1: Point Estimation, Likelihood and Sufficiency	Examples on consistency and Efficiency: Relative efficiency, MVUE Result and Examples, Concept of likelihood estimator, Sufficient statistic,
Month September				
Lectures 8	Practicals 12	Total 20	Unit-2: Cramer Rao Inequality and Methods of Estimation	Statement and proof of CR Rao inequality, def MVBUE, UMVUE, Result and examples
Month- October -November				
Lectures 04	Practicals 08	Total 12	Unit-2: Cramer Rao Inequality and Methods of Estimation	Method of maximum likelihood, method of moment estimator, method of minimum chi square & Examples

Name & Signature of Teacher

(Mr. A. B. Bhosale)



Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026

Semester V

Department -Statistics

Subject - Statistics

Title – Sampling Theory

Course Code: DSC03STA53

Paper No. XI Sampling Theory

Name of teacher – Ms. Makandar A. M.

Month: July			Module/Unit	Sub-units planned
Lectures 8	Practicals 16	Total 24	Unit-1 Basic Terminology and Simple Random Sampling & Stratified Sampling	1. Basic Terminology 2. Simple random sampling, SRSWR, SRSWOR 3. SRS for attributes 4. Determination of the sample size
Month: August				
Lectures 9	Practicals 16	Total 25	Unit-1 Basic Terminology and Simple Random Sampling & Stratified Sampling	1. Stratified random sampling 2. Determination of the sample size under proportional and Neyman allocation 3. Comparison amongst SRSWOR, stratification with proportional allocation and stratification with optimum allocation.
Month: September				
Lectures 12	Practicals 16	Total 28	Unit-2 Other Sampling Methods	1. Systematic Sampling: Real life situations, technique of drawing a sample 2. Comparison of SRS, stratified and systematic sampling when population is in linear trend 3. Circular Systematic Sampling. 4. Cluster Sampling, Two Stage and Multi Stage Sampling, 5. Systematic sampling as a particular case of cluster sampling. 6. Comparison of cluster sampling and SRSWOR
Month: October				
Lectures 8	Practicals 8	Total 16	Unit-2 Other Sampling Methods	1. Ratio Method: Concept of auxiliary variable and its use in estimation 2. Situations where Ratio method is appropriate. 3. Relative efficiency of ratio estimators with that of SRSWOR 4. Regression Method: Situations where is appropriate. 5. Relative efficiency of regression estimators over SRSWOR

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Name & Signature of Teacher

MS. A.M. Makandare



Wan
Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -26

B.Sc. Part-III

Semester V

Department -Statistics

Subject - Statistics

DSE I: Machine Learning

Course - DSE03STA52

Name of teacher: **Ransubhe. P.V.**

Month-July			Module/Unit	Sub-units planned
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-1 Introduction to Data and Classification	1.Understanding data: Types of Data, Data Cleaning, Data Transformation, Data Discretization, Data Visualization, Handling Missing Values 2.Supervised vs. Unsupervised Learning 3. Applications of both learning paradigms, Examples
Month-August				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-1 Introduction to Data and Classification	1. Classification Problem: Binary vs. Multi-class classification, Train-Test Split: Importance, Overfitting vs. Underfitting, Stratified Sampling 2. Classification Techniques: K-Nearest Neighbors (KNN), Naïve Bayes Classifier
Month-September				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-2 Model Evaluation and Accuracy Improvement	1. Performance Measures: Accuracy: Definition, Limitations with imbalanced data Precision, Recall, and F1-score 2. Advanced Model Evaluation: Bootstrap Sampling
Month- October				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-2 Model Evaluation and Accuracy Improvement	1. Cost-Benefit Analysis: Decision-making based on model performance 2. Cluster Analysis using K-Means

Name & Signature of Teacher

P.V. Ransubhe
Ms. P.V. Ransubhe



V.C. Shinde
Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026

Semester VI

Department -Statistics

Subject - Statistics

Title – Probability Theory

Course Code: DSC03STA61

Paper No. XIII: Probability Theory

Name of teacher – Ms. Makandar A.M

Month- November			Module/Unit	Sub-units planned
Lectures 13	Practicals 16	Total 29	Unit-1 Order Statistics & Convergence	1. Order statistics: definition, derivation of distribution function and density function of the i th order statistic. 2. Derivation of joint p. d. f. of i -th and j -th order statistics
Month- December				
Lectures 11	Practicals 16	Total 27	Unit-1 Order Statistics & Convergence	3. Distribution of the sample range and sample median when n is odd. 4. Examples and Problems.
			Unit-1 Order Statistics & Convergence	1. Chebychev's Inequality – for discrete and continuous distributions 2. Convergence: Definition and modes of convergence
Month- January				
Lectures 9	Practicals 12	Total 21	Unit-1 Order Statistics & Convergence	3. WLLN i. i. d. random variables- Derivation , Examples 4. Central Limit Theorem: Statement and proof 5. Simple examples based on Bernoulli, binomial, Poisson and chi-square distribution.
			Unit-1 Order Statistics & Convergence Unit – 2 Simulation Techniques	1. Simple examples based on Bernoulli; binomial, Poisson and chi-square distribution. 2. Simulation Techniques -Meaning of simulation, Monte Carlo simulation, advantages and disadvantages of simulation- Definition and properties of random numbers, 3. generation of pseudo random number
Month- February & March				
Lectures 10	Practicals 8	Total 18	Unit – 2 Simulation Techniques	1. Techniques of generating random numbers from uniform distribution 2. Tests for randomness and uniformity distribution, random variate generation from binomial, Poisson, Geometric, Exponential and normal distribution

Name & Signature of Teacher

Ms. A.M. Makandare



Mrs. V. C. Shinde

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			Module/Unit	Sub-units planned
December-January				
Lectures 12	Practicals 16	Total 28	Unit-1: Interval Estimation & Parametric Tests	1. Notion of interval estimation 2. C.I for Population mean and difference of population means 3. C.I for Population Proportion and difference of population Proportion 4. C.I for Population variance and ratio of population variance 5. C.I for Population median 6. Interval estimation of location and scale parameters of normal distribution (single and two sample). 7. Interval estimation for population proportion and difference between two population proportions. 8. Interval estimation for population median
Month- February				
Lectures 10	Practicals 16	Total 26	Unit-1: Interval Estimation & Parametric Tests Unit-2: Sequential Probability Ratio Tests (SPRT) & Non-parametric Test	1. Basic concepts in Testing of Hypothesis 2. Construction of MP test. 3. Construction of UMP test. 4. LR test and examples 5. General theory of sequential analysis 6. Wald's SPRT of strength (α, β) 7. Graphical and tabular procedure of SPRT 8. Examples & problems
Month- March				
Lectures 10	Practicals 12	Total 22	Unit-2: Sequential Probability Ratio Tests (SPRT) & Non-parametric Test	1. Concept of distribution free statistic. 2. Run test for one & two samples 3. Sign test for one sample and two samples 4. Wilcoxon's signed rank test for one sample and two samples 5. Mann-Whitney U - test & Median test 6. Median test (for two large independent samples) 7. Kolmogorov Smirnov test for one and two samples

Name & Signature of Teacher

(Bhosale A.B.)



Mrs. V. C. Shinde

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 DEPARTMENT OF STATISTICS
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Annual Teaching Plan**Academic year 2025 -2026****Semester VI****Department -Statistics**

Subject - Statistics

Course Code: DSC XIV- DSC03STA63

Course Title – **Design of Experiment (Paper No. XIV)**

Name of teacher – Mrs. V. C. Shinde

Month- November			Module/Unit	Sub-units planned
Lectures 7	Practicals 16	Total 23	Unit-1 Simple Design of Experiment	1. Basic terms in design of experiments, 2. Principles of design of experiments 3. Completely Randomized Design (CRD)
Month- December				
Lectures 8	Practicals 16	Total 20	Unit-1 Simple Design of Experiment	1. Randomized Block Design (RBD) 2. Latin Square Design (LSD) 3. Missing plot technique for RBD and LSD 4. Identification of real-life situations where CRD, RBD and LSD are used.
Month- January				
Lectures 9	Practicals 12	Total 21	Unit-2 Efficiency of design, ANOCOVA and Factorial experiments	1. Efficiency of design 2. Analysis of Covariance (ANOCOVA) with one concomitant variable: Purpose of ANOCOVA 3. Practical situations 4. Estimation of parameters
Month- February & March				
Lectures 13	Practicals 8	Total 21	Unit-4 Efficiency of design, ANOCOVA and Factorial experiments	1. Concept of factorial experiments 2. Definitions of main effects and interaction effects 3. ANOVA for 2^2 and 2^3 factorial experiments arranged in RBD. 4. Total confounding and Partial Confounding

Name & Signature of Teacher

Mrs. V. C. Shinde



Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -26

B.Sc. Part-III

Semester VI

Department -Statistics

Subject: Statistics

DSE II: Quality Management

Course: DSE03STA61

Name of teacher: **Ransubhe P. V.**

Month- November -December			Module/Unit	Sub-units planned
Lectures 16	Practicals 16 B.Sc. II 16	Total 48	Unit-1 Quality Tools and Process Control	1. Quality Tools and Process Control 2. Histogram, Check sheet, Pareto diagram, cause and effect diagram, scatter diagram, control chart, flow chart. Deming's PDCA cycle
Month-January				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-1 Quality Tools and Process Control	1. Process Control 2. Control charts for variables 3. Control charts for Attributes
Month-February				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-2 Product Control	1. CUSUM chart, tabular form, V-mask technique 2. Moving average and exponentially weighted moving average charts 3. six-sigma methodology, DMAIC cycle
Month- March				
Lectures 08	Practicals 16 B.Sc. II 16	Total 40	Unit-2 Product Control	1. Product Control 2. Sampling Inspection plans for attribute inspection 3. AQL, LTPD, Consumer's risk, producer's risk, AOQ, AOQL, OC, ASN and ATI.
Month- April-May				
Lectures 10	Practicals 08 B.Sc. II 08	Total 26	Unit-2 Product Control	1. Single and double sampling plans with determination of above constants 2. Sequential Sampling, Continuous sampling plans.

Name & Signature of Teacher

P. V. Ransubhe
Ms. P. V. Ransubhe.



V. C. Shinde
Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025-2026

Semester III

Department -Statistics

Subject - Statistics

Title -Reliability Theory

Course - MIN03STA51

Name of teacher – Patil D.D.

Month-July			Module/Unit	Sub-units planned
Lectures 06	Practicals 16	Total 22	Unit-1	1. Coherent systems and structural properties. 2. Binary systems and types of systems. 3. Structure functions of series, parallel, and k-out-of-n systems. 4. Reliability Block Diagram (RBD).
Month-August				
Lectures 08	Practicals 16	Total 24		1. Structure function of coherent systems. 2. Reliability Block Diagram (RBD). 3. Path sets and cut sets. 4. Minimal path and minimal cut sets. 5. Reliability of coherent systems using path/cut sets.
Month-September			Unit-2Ageing Properties	
Lectures 08	Practicals 16	Total 24		1. Coherent structure function and relevant component. 2. Ageing and lifetime functions (PDF, Survival, Hazard). 3. Cumulative hazard, MRL, and ERL functions. 4. IFR, DFR, IFRA, and DFRA ageing properties.
Month- October – November				
Lectures 07	Practicals 16	Total 23		1. Hazard rate of a series system. 2. IFR property of a series system. 3. Ageing properties of Exponential, Gamma, Weibull, and Pareto distributions.

Name & Signature of Teacher

(Mr. D. D. Patil)



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Annual Teaching Plan

Academic year 2025 -2026

Semester IV

Department -Statistics

Subject - Statistics

Title: Stochastic Process

Course: MIN03STA61

Name of teacher – Patil D.D.

Month-December			Module/Unit	Sub-units planned
Lectures 08	Practicals 16	Total 24	Unit-1	1. Introduction to stochastic processes and state space. 2. Classification of stochastic processes (discrete/continuous). 3. Markov chain: definition and examples. 4. Homogeneous and non-homogeneous Markov chains.
Month-January				
Lectures 09	Practicals 12	Total 21	Unit-1	1. Transition probability matrix and Chapman–Kolmogorov equation. 2. Classification of states: accessible, communicating, closed, absorbing, reducible, irreducible. 3. Stationary probability distribution and simple problems. 4. Markov processes: Pure birth, Poisson, and Birth–Death processes.
Month-February				
Lectures 07	Practicals 16	Total 23	Unit-2	1. Introduction and basic features of queuing systems. 2. Input source, queue configuration, queue discipline, and service mechanism. 3. Operating characteristics of queuing systems. 4. Transient state and steady-state concepts.
Month- March				
Lectures 08	Practicals 16	Total 24	Unit-2	1. Queue length and relationships among system characteristics. 2. Probability distributions of arrival, inter-arrival, departure, and service times. 3. Queuing model M/M/1 with FCFS discipline. 3. Performance measures of queuing systems.
Month- April				
Lectures 04	Practicals 8	Total 12	Unit-2	1. Applications of queuing theory. 2. Numerical problems on M/M/1 model. 3. Simple examples and problem solving.

Name & Signature of Teacher

(Mr. D. D. Patil)



Mrs. V. C. Shin
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Annual Teaching Plan

Academic year 2025 -26

B.Com. Part-II

Semester III

Department -Statistics

Subject - Statistics

Course - SEC02STA31

Paper I- Business Statistics III

Name of teacher – Mr. A. P. Patil

Month-July			Module/Unit	Sub-units planned
Lectures 08	Practicals 0	Total 08	Unit-1 Correlation	1. Concept and types of correlation. 2. Methods of studying correlation: Scatter diagram 3. Karl Pearson's correlation coefficient (r), computation of r for ungrouped data 4. Properties of correlation coefficient (r): (i) $-1 \leq r \leq 1$, interpretation of $r = -1$, $r = 0$, $r = +1$. (ii) Effect of change of origin and scale
Month-August			Unit-1 Correlation	1. Spearman's rank correlation coefficient (R) 2. Computation of R (with and without tie). 3. Numerical problems.
Month-September			Unit-2 Regression	1. Concept of regression. 2. Lines of regression 3. Fitting of lines of regression by least square method
Month- October			Unit-2 Regression	1. Regression coefficients b_{xy} & b_{yx} 2. Properties of regression coefficients 3. Numerical problems.

Name & Signature of Teacher

Dr. Patil Abhilesh P.



Ms. V. C. Shinde

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Annual Teaching Plan

Academic year 2025-26

B.Com. Part-II Semester IV

Department -Statistics

Subject - Statistics

Paper II Business Statistics – IV

Course - SEC02STA41

Name of teacher – Mr. A. P. Patil

Month- December			Module/Unit	Sub-units planned
Lectures 08	Practicals -	Total 08	Unit-1 Time Series	1.Definition and uses of time series, components of time series. 2.Additive and multiplicative models, 3.Methods of determination of trend: method of moving averages, method of progressive averages, method of least squares (only for straight line)
Month-January				
Lectures 08	Practicals -	Total 08	Unit-1 Time Series	1.Method of determination of seasonal variations: Simple average method 2.Numerical problems
Month-February				
Lectures 08	Practicals -	Total 08	Unit-2 Index Number	1.Need and meaning of index number. 2.Problems involved in construction of index number. 3.Price, quantity and value index number. 4.Simple (unweighted) index number
Month- March				
Lectures 08	Practicals -	Total 08	Unit-2 Index Number	1. Weighted index numbers: Laspeyre's, Paasche's and Fisher's index numbers. 2. Cost of living index number: Definition, construction by using family budget method and Expenditure method.
Month- April				
Lectures 04	Practicals -	Total 4	Unit-2 Index Number	1. Uses of index numbers 2. Numerical problems

Name & Signature of Teacher

Mr. Patil Abhilash P.



Ms. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026

Semester I

Department – Statistics

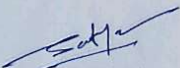
Subject – Statistics

Title – Distribution Theory

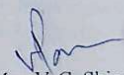
Course Code – DSC17STA11

Name of teacher – **Mr. S. S. Salokhe**

Month – July			Module / Unit	Sub-units planned
Lectures	Practicals	Total	Unit – I	1. Review of Basics of Probability Distributions. 2. Cumulative distribution function(CDF). 3. Mixture of distribution. 4. Integral transformation.
16	16	32		
Month - August				
Lectures	Practicals	Total	Unit – II	1. Location, Scale and Shape parameters 2. Symmetric distributions and its properties. 3. Inequalities 4. Random vectors and Transformations 5. Convolutions and Compound distributions
14	16	30		
Month - September				
Lectures	Practicals	Total	Unit – III	1. Bivariate Normal distribution 2. Multivariate normal distribution. 3. Characteristic function and moments. 4. MLE of Multivariate normal distribution.
16	15	31		
Month – October - November				
Lectures	Practicals	Total	Unit – IV	1. Sampling distributions. 2. Central and non-central chi-square, t and F distributions. 3. Fisher Cochran and related theorems. 4. Order Statistics. 5. Distribution of Spacings.
26	22	48		


Mr. S. S. Salokhe




Mrs. V. C. Shinde
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Academic year 2025-2026

Annual Teaching Plan

Semester I

Department -Statistics

Subject - Statistics

Course - 2DSC17STA12

Title - ESTIMATION THEORY

Paper No. II- ESTIMATION THEORY(2DSC17STA12)

Name of teacher – Bhosale A.B.

			Module/Unit	Sub-units planned
Month-June -July				
Lectures 12	Practicals 16	Total 28	Unit-1 Sufficiency, Completeness	1.Sufficiency principle, minimal sufficient statistic for exponential family, Pitman family. 2.Completeness, bounded completeness, ancillary statistics, Basu's theorem and applications.
Month-August				
Lectures 12	Practicals 12	Total 24	Unit-2 Point estimation, Rao-Blackwell theorem and Lehmann-Scheffe theorem	1.Problem of point estimation, 2.Unbiased estimators, minimum variance unbiased estimator, 3.Rao- Blackwell theorem and Lehmann-Scheffe theorem and their uses.
Month-September				
Lectures 10	Practicals 12	Total 22	Unit-2 MVUE, Cramer-Rao inequality, Chapman-Robinson bounds, Bhattacharya bounds	1.Necessary and sufficient condition for MVUE and their applications. 2.Fisher information and information matrix, Cramer- Rao inequality, Chapman-Robinson bounds, 3.Bhattacharya bounds, their applications.
			Unit-3 MLE, Method of moments, minimum Chi square. U-Statistics	1.Method of maximum likelihood (MLE) and small sample properties of MLE 2.Method of scoring and application to estimation in multinomial distribution. MLE in non-regular families. 3.Other methods of estimation: method of moments, minimum Chi square. U-Statistics
Month- October-November				
Lectures 17	Practicals 12	Total 29	Unit-4 Bayes estimation	The concept of prior distributions 1. posterior distribution 2. Bayes estimation under squared error and absolute error loss functions.

Name & Signature of Teacher



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Annual Teaching Plan

Academic year 2025 -2026

Semester II

Department – Statistics

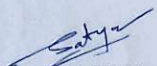
Subject – Statistics

Title – Probability Theory

Course Code – DSC17STA21

Name of teacher – **Mr. S. S. Salokhe**

Month – December			Module / Unit	Sub-units planned	
Lectures	Practicals	Total	Unit – I	1. Classes of sets & Sequence of sets	
16	16	32		2. Sigma & Borel field	
					3. Probability measure and Probability space
					4. Lebesgue measure
					5. Lebesgue Stieltjes measure on R
					6. Independence of events
Month – January					
Lectures	Practicals	Total	Unit – II	1. Measurable function & Random variable	
15	14	29		2. Simple & Elementary R.V	
					3. Integration of measurable function
					4. Characteristic function
Month - February					
Lectures	Practicals	Total	Unit – III	1. Monotone Convergence, Fatous lemma & Dominated Convergence.	
13	16	29		2. Borel – Cantelli lemma	
					3. Convergence (prob. seq. of r.v., distribution, a.s.)
					4. Yule Slutsky results
Month – March-April					
Lectures	Practicals	Total	Unit – IV	1. Law of Large numbers	
24	20	44		2. Central Limit theorem(CLT)	
					3. Kolmogorov inequalities
					4. Strong law of large numbers
					5. Lindeberg, Liaponove's and Lindeberg – Feller forms.


Mr. S. S. Salokhe




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Paper No. VII-THEORY OF TESTING OF HYPOTHESIS

Name of teacher – Bhosale A.B.

Month- November-December			Module/Unit	Sub-units planned
December-January				
Lectures	Practicals	Total	Unit-1	1.Problem of testing of Hypothesis, Simple and composite hypotheses. 2.Randomized and non- randomized tests, most powerful test, Neyman-Pearson Lemma and its applications. 3.Determination of minimum sample size to achieve the desired strengths. 4.Monotone likelihood ratio property, UMP test, power function of a test, existence of UMP. 5.Tests for one-sided alternatives. Concept of p-value.
15	12	27		
Month- February				
Lectures	Practicals	Total	Unit-2	1.UMP tests for two sided alternatives examples, their existence and non- existence. 2.Generalized Neyman Pearson lemma, unbiased test. 3.UMPU test and their existence in the case of exponential families (Statements of the theorems only). 4.Similar tests, test with Neyman structure
12	12	24		
Month- March				
Lectures	Practicals	Total	Unit-3	1.Problem of confidence intervals 2.UMA and UMAU confidence intervals.
16	12	28		
			Unit-4	3.Likelihood ratio test and its application to standard distribution. 4.Goodness of fit tests based on Chi-square distribution
Month- April				
Lectures	Practicals	Total	Unit-4	1.Spearman's Rank Correlation Test; Kendall's Rank Correlation Test; Kruskal-Wallis Test; 2.Fridman's Two-way analysis of variance by ranks. 3.Spearman's Rank Correlation Test; Kendall's Rank Correlation Test 4.Kruskal-Wallis Test; Fridman's Two-way analysis of variance by ranks
17	12	29		

Name & Signature of Teacher

(Bhosale A. B.)



Mrs. V. C. Shinde
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Annual Teaching Plan

Academic year 2025 -26

M.Sc. Part-I

Semester II

Department -Statistics

Subject: Statistics

DSC III: Multivariate Analysis

Course: DSC18STA23

Name of teacher: **Ransubhe P. V.**

Month- November -December			Module/Unit	Sub-units planned
Lectures 16	Practicals 16	Total 32	Unit-1	1. Multivariate Normal distribution Hotelling's T ² Statistic and its null distribution 2. Applications of T ² statistics and its relationship with Mahalanobis' D ² statistic, 3. Confidence region for the mean vector
Month-January			Unit-1	1. Wishart matrix and its distribution 2. Properties of Wishart distribution, distribution of generalized variance
Lectures 08	Practicals 16	Total 24		
Month-February			Unit-2	1. Discrimination and classification. 2. Fisher's discriminant function and likelihood ratio procedure. 3. minimum ECM rule, Rao's U statistics and its use in tests associated with discriminant function
Lectures 08	Practicals 16	Total 24		
Month- March			Unit-2	1. Classification with three populations. Cluster analysis. 2. Hierarchical methods: Single, Complete, average linkage method. 3. non-hierarchical clustering method-k means clustering
Lectures 08	Practicals 16	Total 24		
Month- April-May			Unit-2	1. Canonical correlation analysis, Introduction to principal component analysis 2. Introduction to factor analysis and estimation.
Lectures 08	Practicals 16	Total 24		

Name & Signature of Teacher

Ransubhe
Ms. P. V. Ransubhe.



Mrs. V. C. Shinde
Mrs. V. C. Shinde

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Annual Teaching Plan

Academic year 2025 -2026

Semester III

Department – Statistics

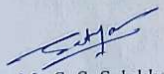
Subject – Statistics

Title – Stochastic Processes

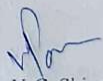
Course Code – DSC17STA31

Name of teacher – **Mr. S. S. Salokhe**

Month – July			Module / Unit	Sub-units planned
Lectures	Practicals	Total	Unit – I	1. Stochastic Processes and its Classification. 2. Finite dimensional distributions. 3. Markov Property and Formulation of Markov chain Models. 4. T.P.M and initial distributions 5. Chapman Kolmogorov equations 6. Cal. of n- step transition probabilities. 7. Simulation of Markov chain.
17	30	47		
Month - August				
Lectures	Practicals	Total	Unit – II	1. Classification of States 2. Reducible & Irreducible Markov chain 3. Random walk & Gambler's ruin problem 4. First entrance theorem 5. Long -run proportions and limiting probabilities 6. Mean recurrence time & Stationary distribution.
16	28	44		
Month - September				
Lectures	Practicals	Total	Unit – III	1. Discrete state space continuous time Markov chain 2. Poisson Process 3. Birth and death processes 4. Renewal processes 5. Simulation of Poisson & discrete state space Markov processes.
15	30	45		
Month – October - November				
Lectures	Practicals	Total	Unit – IV	1. Branching processes. 2. Generating functions and moments 3. Probability of ultimate extinction. 4. Simulation of branching processes. 5. Queuing theory.
24	32	56		


Mr. S. S. Salokhe




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(EMPOWERED AUTONOMOUS)

Annual Teaching Plan

Academic year 2025-2026

M. Sc.-II Semester- III

Department -Statistics

Subject -Applied Statistics Title - : STATISTICAL QUALITY CONTROL Course – DSE18STA32

Name of teacher – Patil D. D.

Month- July			Module/Unit	Sub-units planned
Lectures 16	Practicals 16	Total 32	Unit-1	1. Quality Improvement Tools 2. Shewhart Control charts 3. Performance measures of a control chart, $\bar{X}$, R, S, S^2 , p, c and D charts, σ -control limits and probability control limits 4. Economic design of a control chart
Month- August				
Lectures 18	Practicals 16	Total 34	Unit -2	1. CUSUM and EWMA charts 2. SPRT chart, GLR Chart, charts for autocorrelated data, nonparametric control charts, Bayesian control charts. The change point model for process monitoring
Month- September				
Lectures 14	Practicals 16	Total 30	Unit-3	1. Process capability Analysis 2. process capability, process capability indices (C_p , C_{pk} , C_{pm} , C_{pmk}), point and interval estimation of C_p and C_{pk} 3. DIMAC process 4. Six Sigma Methodology
Month- October-November				
Lectures 16	Practicals 12	Total 28	Unit-4	1. Acceptance sampling plans for attributes 2. Single sampling plan,
Month- December				
Lectures 15	Practicals 16	Total 31	Unit-4	3. Double and multiple sampling plans, sequential sampling 4. Deming inspection criterion, Continuous sampling plans, skip-lot sampling plans.

Name & Signature of Teacher

(Mr. D.D. Patil)

Mrs. V. C. Shinde
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Annual Teaching Plan

Academic year 2025 -26

M.Sc. Part-II

Semester III

Department -Statistics

Subject - Statistics

DSC II: Statistical Learning & Data Mining

Course – DSC17STA32

Name of teacher: **Ransubhe. P.V.**

Month-July			Module/Unit	Sub-units planned
Lectures 16	Practicals 16	Total 32	Unit-1 Data understanding	1.Understanding data 2.Supervised vs. Unsupervised Learning 3. classification techniques: k-nearest neighbor, decision tree, Naïve Bayes 4. classification based on logistic regression, Bayesian belief Network
Month-August				
Lectures 16	Practicals 16	Total 32	Unit-2 Model evaluation and selection	1. Metrics for Evaluating Classifier Performance 2. Holdout Method and Random Subsampling, Cross-Validation, Bootstrap 3. Model Selection Using Statistical Tests of Significance 4. Cost-Benefit and ROC Curves. 5. Improving Classification Accuracy of Class-Imbalanced Data
Month-September				
Lectures 16	Practicals 16	Total 32	Unit-3 ANN and SVM	1. Introduction to ANN 2. McCulloch-Pitts AN model, single layer network, multilayer feed forward network model 3. support vector machine, loss functions, soft margin, optimization hyperplane 4. support vector machine for classification and regression.
Month- October				
Lectures 16	Practicals 16	Total 32	Unit-4 Unsupervised learning	1. Clustering: k-medoids, CLARA, DENCLUE, DBSCAN 2. Probabilistic model-based clustering, Scalable clustering 3. Market Basket Analysis: Association rules and prediction 4. applications to electronic commerce

Name & Signature of Teacher

P. V. Ransubhe
M. P. V. Ransubhe



V. C. Shinde
 Mrs. V. C. Shinde

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 DEPARTMENT OF STATISTICS
 VIVEKANAND COLLEGE, KOLHAPUR
 (EMPOWERED AUTONOMOUS)

Annual Teaching Plan

Academic year 2025 -2026

Semester IV

Department – Statistics

Subject – Statistics

Title – Optimization Techniques

Course Code – DSE17STA41

Name of teacher – **Mr. S. S. Salokhe**

Month – December			Module / Unit	Sub-units planned
Lectures	Practicals	Total	Unit – I	1. Pre-requisites of LPP (Convex sets and functions) 2. Review of LPP 3. Simplex algorithm and related theorems 4. Artificial variable technique. 5. Degeneracy
15	28	43		
Month – January				
Lectures	Practicals	Total	Unit – II	1. Duality and related theorems 2. Complementary Slackness property 3. Dual Simplex algorithm 4. Sensitivity Analysis
14	30	44		
Month - February				
Lectures	Practicals	Total	Unit – III	1. Integer Linear Programming Problem (ILPP) 2. Cutting plane method 3. Mixed ILPP 4. Branch and Bound method 5. Quadratic programming (K-T conditions, Beale Method)
17	26	43		
Month – March-April				
Lectures	Practicals	Total	Unit – IV	1. Two sum person zero sum games. 2. Minimax and Maximin principle 3. Rules of dominance 4. Algebraic method & Graphical method 5. Recursion Equation Approach 6. Characteristics of Dynamic Programming
26	38	64		


Mr. S. S. Salokhe




Mrs. V. C. Shinde

HEAD

DEPARTMENT OF STATISTICS
YASHWANTRAO CHAVAN COLLEGE, KOLHAPUR
(EMPOWERED AUTONOMOUS)

Annual Teaching Plan

Academic year 2025-2026

M. Sc. II Semester IV

Department -Statistics

Subject - Statistics

Course – DSC17/18STA41

Title -: TIME SERIES ANALYSIS

Name of teacher – Patil D.D.

Month-December			Module/Unit	Sub-units planned
Lectures 15	Practicals 16	Total 31	Unit-1	1. Exploratory time series analysis 2. Holt – Winter smoothing and forecasting 3. Auto - Covariance, Auto-correlation functions 4. Partial auto covariance function 5. First and second order Stationary time series
Month- January				
Lectures 17	Practicals 16	Total 33	Unit -2	1. Wold representation of linear stationary processes 2. linear time series models: Autoregressive, Moving Average, Autoregressive Moving Average models 3. Computation of ACVF, ACF and PACF for AR(1), AR(2), MA(1), MA(2), ARMA(1,1) process
Month- February				
Lectures 16	Practicals 12	Total 28	Unit-3	1. Estimation of ARMA models: Yule-Walker estimation for AR Processes 2. Maximum likelihood and least squares estimation 3. Minimum mean squared error forecasting
Month- March				
Lectures 16	Practicals 16	Total 32	Unit-3	1. Introduction to SARIMA models. 2. Spectral Representation of the ACVF, Spectral density of an ARMA process, its computation for simple models.
Month-April-May				
Lectures 12	Practicals 16	Total 28	Unit-4	1. Introduction to ARCH and GARCH models 2. Vector time-series models: Covariance and Correlation Matrix functions, 3. MA and AR representation of vector processes, Covariance matrix function of the vector AR(1) and MA(1) models.

Name & Signature of Teacher

(Mr. D. D. Patil)



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DEPARTMENT OF STATISTICS
VEKHANAND COLLEGE, KOLHAPUR
(WOMEN EMPOWERED AUTONOMOUS)

Annual Teaching Plan

Academic year 2025-2026

M. Sc. II Semester IV

Department -Statistics

Subject -Statistics.

Course -DSE17STA42/ DSE18STA42

Title: DESIGN AND ANALYSIS OF EXPERIMENTS

Name of teacher - Patil D.D.

Month-December			Module/Unit	Sub-units planned
Lectures 15	Practicals 16	Total 31	Unit-1	1. Concepts and principles of DOE. 2. One-way & Two-way ANOVA. 3. Contrasts and multiple comparison tests. 4. Block designs and BIBD.
Month- January				
Lectures 16	Practicals 16	Total 33	Unit -2	1. Factorial designs and effects. 2. Two-factor and 2^k factorial designs. 3. Blocking and confounding. 4. Fractional factorial designs.
Month- February				
Lectures 16	Practicals 12	Total 28	Unit-3	1. Design resolution: Resolution III and Resolution IV designs. 2. Fold-over designs and saturated designs. 3. Applications and interpretation of fractional factorial experiments. 4. Numerical problems and analysis using factorial designs.
Month- March				
Lectures 16	Practicals 16	Total 32	Unit-3	1. 3^k full factorial design and analysis using fixed effect models. 2. Confounding in 3^k factorial designs. 3. Construction and analysis of 3^{k-p} fractional factorial designs and alias structures.
Month-April-May				
Lectures 11	Practicals 16	Total 27	Unit-4	1. Factorials with mixed levels (2 & 3 levels, 2 & 4 levels). 2. Design optimality criteria. 3. Selection of efficient experimental designs. 4. Revision, practical implementation and problem-solving sessions.

Name & Signature of Teacher

(Mr. D.D. Patil)



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