

Academic Council

Item No: \_\_\_\_\_

Devrukh ShikshanPrasarakMandal's

**Nya.TATYASAHEB ATHALYE ARTS, Ved. S.R. SAPRE  
COMMERCE & Vid. DADASAHEB PITRE SCIENCE  
COLLEGE, DEVRUKH [AUTONOMOUS]**



**Syllabus for F.Y. B.Sc.**

**Program: B.Sc.**

**Course: Statistics**

**Credit Based Semester and Grading System with the  
Effect from  
Academic Year 2019-20**

**B. Sc. General (Semester Pattern) B. Sc. First Year**

**BOTANY – CURRICULUM**

Semester	Paper Code	Paper	Lectures /Practicals	Marks			Credits
				External	Internal	Total	
Semester I	ASPSTA.1.01	Theory Paper I Descriptive Statistics (A)	45	70	30	100	02
	ASPSTA.1.02	Theory Paper II Statistical Methods (A)	45	70	30	100	02
	ASP.STA.1.PR	Practical Paper I	02	35	15	50	01
Semester II	ASP.STA.2.01	Theory Paper I Descriptive Statistics (B)	45	70	30	100	02
	ASP.STA.2.02	Theory Paper II Statistical Methods (B)	45	70	30	100	02
	ASP.STA.2. PR	Practical Paper II	02	35	15	50	01

**Semester I Theory Paper I**

**Learning Objectives:**

- To introduce the technique of data collection and its presentation.
- To emphasize the need for numerical summary measures for data analysis.

Course Code ASPSTA.1.0 1	Title	Lectures	Credits
<b>Unit</b>	<b>Descriptive Statistics (A)</b>	<b>45</b>	<b>02</b>
<b>Unit I</b> Data: Types , Collection and Management.	<p><u>data from a population :</u> Qualitative and Quantitative data; Geographical, Time series data; Discrete and Continuous data, Panel and Cross Section data. Different types of scales: Nominal, Ordinal, Ratio and Interval.</p> <p><u>Collection of Data :</u> Concepts of statistical population and sample. Primary data- designing a questionnaire / schedule, distinction between them, Problems when collecting data through the questionnaire. Secondary data– its major sources including some government publications.</p> <p><u>Elementary Categorical Data Analysis</u> Preparation of tables with two or three factors (variable /attributes) of classification. Requisites of a good table. Independence and Association for 2 attributes in a 2 x 2 table using Yule's coefficient of colligation and coefficient of association. Relationship between the two coefficients.</p>	15	
<b>Unit II</b> Presentation of Data.	<p><u>Univariate :</u> Frequency distribution of discrete and continuous variables, Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, Frequency polygon, Frequency curve and Ogives. Diagrammatic representation using Bar diagrams and Pie chart. Exploratory data analysis: Stem and Leaf diagram, Dot plot.</p> <p><u>Bivariate :</u> Frequency distribution, Marginal and Conditional frequency distributions.</p>	15	
<b>Unit III</b> Measures of Central Tendency or Location.	<p>Arithmetic mean and its properties (simple and weighted), Combined mean. Geometric mean and Harmonic mean. Quantiles (Median, Quartiles, Deciles, Percentiles.) Mode. (Grouping Method not expected). Empirical relationship between mean, median and mode. Merits, Demerits and Uses of Mean, Median, Mode, G.M. and H.M. Requisites of a good average. Choice of scale of measurement for each measure of central tendency:</p>	15	

**Semester I Theory Paper II**

**Learning Objectives:**

The students will be able to understand-

- Concept of probability
- Probability distribution
- Testing of hypotheses.

Course Code ASPSTA.1.0 2	Title	Lectures	Credits
Unit	Statistical Methods (A)	45	02
Unit I Elementary probability theory.	Random Experiment, Sample Point & Sample Space. Discrete Sample Space, Definition of Event, Elementary Event, Algebra of Events. Mutually exclusive events, Exhaustive events. Subjective Probability. Classical, Empirical and Axiomatic definitions of probability. Conditional Probability, Independence of n Events.( n = 2, 3 ). Theorems on Addition & Multiplication of Probabilities, Bayes' Theorem (All theorems with proofs).	15	
Unit II Discrete Random variable:	Random variable. Definition, Properties of Probability Mass Function & Cumulative Distribution Function. Expectation and variance of a random variable. Theorems on Expectation and Variance . Raw & Central Moments and their relationship (without proof). Concept of Skewness and Kurtosis. <u>Bivariate :</u> Joint Probability Mass Function of two Discrete Random Variables, Marginal and Conditional Probability Distributions, Independence of Two Random Variables. Theorems on Expectation, Variance. Covariance, Correlation coefficient between two random variables	15	
Unit III Standard Discrete Probability Distributions:	Degenerate distribution; Bernoulli distribution, Binomial Distribution, Poisson Distribution, Hyper geometric Distribution. Uniform Distribution Derivation of mean, & variance, Calculation of Expected frequencies. Binomial approximation to Poisson and Hyper geometric approximation to Binomial Distribution (statement only).	15	

Course Code ASPUSMTP01 Semester I Practical Paper I – Descriptive Statistics (A)			
Sr.No.	Practicals	L	Cr
		02	01
1.	Collection of Data from Secondary source (including Internet sites) / Primary source		
2.	Tabulation of data (Quantitative and Categorical)		
3.	Classification of data.		
4.	Graphs and Diagrams		
5.	Measures of Central Tendency.		

Course Code ASPUSMTP01 Semester I Practical Paper II – Statistical Methods (A)			
Sr.No.	Practicals	L	Cr
		02	01
1.	Probability		
2.	Discrete Random Variable		
3.	Bivariate Probability Distributions.		
4.	Binomial, Poisson and Hyper geometric Distributions.		
5.	Calculation of Expected frequency from a conducted experiment		

Semester II Theory Paper I			
<b>Learning Objectives:</b>			
The students will be able to understand-			
<ul style="list-style-type: none"> <li>To orient students on techniques of data analysis</li> </ul>			
Course Code ASP.STA.2. 01	Title	Lectures	Credits
<b>Unit</b>	<b>DESCRIPTIVE STATISTICS (B)</b>	<b>45</b>	<b>02</b>
<b>Unit I</b> Absolute and Relative Measures of Dispersion	Range, Interquartile Range, Quartile Deviation, Mean Absolute Deviation, Standard Deviation (Variance) and their relative measures. Combined variance. Raw and Central moments up to fourth order and the relationship between them (with proof). Measures of Skewness and Kurtosis Box-Whisker Plot.	15	
<b>Unit II</b> Analysis of Bivariate Data	Scatter diagram. Product Moment correlation coefficient and its properties. Rank correlation- Spearman's measure. Concept of linear regression. Principle of least squares. Fitting of straight line by method of least squares. Relation between regression coefficients and correlation coefficient. Coefficient of determination. Fitting of curves reducible to linear form by transformation. Fitting of quadratic curve using least squares.	15	
<b>Unit III</b> Index Numbers.	number as a comparative tool. Stages in the construction of Index Numbers. Simple and Composite Index Numbers. Fixed base Index Numbers. Chain Base Index Numbers, Base shifting, Splicing and	15	

Deflating. Price and Quantity Index Numbers - Laspeyres', Paasche's, Marshal-Edge worth's, Dorbisch-Bowley's and Fisher's Index Numbers. Value Index Number. Time reversal test. Factor reversal test, Circular test. Cost of Living Index Number. Concept of Real Income based on the Consumer Price Index Number. Problems in the construction of Consumer Price Index Number.		
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**Semester II Theory Paper II**

**Learning Objectives:**

The students will be able to understand:-

- Continuous probability distributions
- Testing of hypotheses.

Course Code ASP.STA.2. 02	Title	Lectures	Credits
<b>Unit</b>	<b>STATISTICAL METHODS (B)</b>	<b>45</b>	<b>02</b>
<b>Unit I</b> Continuous Random variable	Concept and properties of Probability Density Function and Cumulative Probability distribution Function. Expectation and variance of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and Central Moments. (Simple illustrations).	15	
<b>Unit II</b> Some Standard Continuous Probability Distributions.	Rectangular Distribution, Exponential Distribution and Normal Distribution. Derivation of mean, median and variance for Rectangular and Exponential distribution. Properties of Normal Distribution and Normal Curve (without proof). Normal Approximation to Binomial and Poisson Distributions (without proof). and using graph / probability histogram	15	
<b>Unit III</b> Sampling Distribution.	Concept of Parameter, Statistic, Estimator and bias. Sampling distribution. Of estimator. Standard error and M.S.E. of an estimator. Central Limit Theorem (Statement only). Sampling distribution of sample mean and sample proportion for large samples. Point and interval estimation of single mean and single proportion, for large sample only. Statistical tests - Concept of Hypotheses. (Null and Alternative Hypotheses.). Types of Errors, Critical Region, Level of Significance, p-value Large Sample Tests using Central Limit Theorem, if necessary.	15	

Course Code STA.2.01 Semester II Practical Paper I – DESCRIPTIVE STATISTICS ( B)			
Sr.No.	Practicals	L	Cr
		09	01
1.	Measures of Dispersion.		
2.	Skewness and Kurtosis.		
3.	Correlation Analysis		
4.	Regression Analysis.		
5.	Curve fitting by the Method of Least Squares. Index Numbers.		

Course Code ASP.STA.2.02 Semester II Practical Paper II – STATISTICAL METHODS ( B)			
Sr.No.	Practicals	L	Cr
		09	01
1.	Continuous Random Variables.		
2.	Uniform, Exponential Distributions.		
3.	Normal Distribution		
4.	Testing of Hypotheses		
5.	Estimation Large Sample Tests.		

## Reference Books

1. Goon A.M., Gupta M.K., Dasgupta B. Fundamentals of Statistics, Volume I, The World Press Private Limited, Calcutta. Fifth edition.
2. Kothari, C.R.: Research Methodology, Methods and Techniques , Wiley Eastern Limited. First Edition.
3. Shah R.J. Descriptive Statistics, Seth Publications. Eighth edition.
4. Spiegel, M.R.: Theory and Problems of Statistics, Schaum's Publishing Series. Tata McGraw-Hill. First edition.
5. Welling, Khandeparkar, Pawar, Naralkar : Descriptive Statistics : Manan Prakashan
6. S.P. Gupta : Statistical Methods, Sultan Chand & Sons. First edition.
7. Richard. I. Levin, David .S. Rubin: Statistics for Management . . Fifth edition
8. Prem . S. Mann (2007) . Introductory Statistics (6Allan Bluman (2009) Introductory
9. Statistics. A <sup>th</sup> step edition) John Wiley & Sons. by step approach (7<sup>th</sup> edition). McGraw-Hill
10. Statistical Methods : R.J. Shah – Seth Publications. Tenth edition.
11. Basic Statistics : B.L. Agarwal – New Age International Ltd. Fifth edition
12. Theory and Problems of Statistics : Spiegel M.R. – Schaums Publishing Series, Tata Mcgraw - Hill. First edition
13. Probability and Statistical Inference : Hogg R.V, Tanis E.P. – Macmillan Publishing Co. Inc.
14. Fundamentals of Mathematical Statistics : S. C. Gupta, V.K.Kapoor – Sultan Chand & Sons. Eleventh edition.
15. Statistical Methods : S.P. Gupta – Sultan Chand & Sons. Thirty third edition.

16. Fundamentals of Statistics, Volume II, -Goon A.M., Gupta M.K., Dasgupta B. – The World Press Pvt. Ltd, Calcutta. Fifth edition.
17. (Allan Bluman (2009) Introductory Statistics, A step<sup>th</sup> edition) John Wiley & Sons. by step approach (7<sup>th</sup> edition), McGraw-Hill
18. [www.actuaries.org.uk](http://www.actuaries.org.uk)
19. [www.actuariesindia.org](http://www.actuariesindia.org)
20. [www.soa.org](http://www.soa.org)
21. Spiegel, M.R.: Theory and Problems of Statistics, Schaum's Publishing Series. Tata McGraw-Hill. First edition.
22. Statistical Methods : R.J. Shah – Seth Publications. Tenth edition.

## Evaluation Pattern

External evaluation: Internal evaluation (70:30)

Theory:-External evaluation (70 Marks) Question Paper Pattern

Time: 2.5 hours

No.	Question Pattern	Marks
Q.1	a) Long Answer Questions (based on Unit I)	15
	b) Short Answer Questions (based on Unit I)	
Q.2	a) Long Answer Questions (based on Unit II)	15
	b) Short Answer Questions (based on Unit II)	
Q.3	a) Long Answer Questions (based on Unit III)	15
	b) Short Answer Questions (based on Unit III)	
Q.4	a) Long Answer Questions (based on Unit I, II, and III)	15
Q.5	Fill in the blanks by choosing appropriate options (10 MCQs)	10
<b>Total</b>		<b>70</b>

Theory:-Internal evaluation (30 Marks)

Description	Marks
Test	10
Assignment	10
Overall Conductance	10
<b>Total</b>	<b>30</b>



**Paper pattern for each course :** ASPSTA.1.01, ASPSTA.1.02 and  
ASP.STA.2.01, ASP.STA.2.02

**Practical:-Internal evaluation (50 Marks) Question Paper Pattern**

No.	Question Pattern	Marks
Q.1	Fill in the blanks by choosing appropriate options (8 MCQs)	24
Q.2	Long Answer Questions (based on Unit I)	16
	Performance in Regular Practical's	05
	Viva	05
<b>Total</b>		<b>50</b>

### **Expected Learning Outcomes**

**(Programme Outcomes, Programme Specific Outcomes, Course Outcomes )**

#### **B.Sc. Statistics**

##### **Programme Outcomes**

- PO1. Acquires the ability to understand and analyze the problems.
- PO2. Develop the skill to think critically on abstract concept of statistics.
- PO3. Acquire the ability to think independently paving way for lifelong learning.
- PO4. Analyses the situation, make a statistical problem and find its solution.
- PO5. Enhance logical reasoning skills, arithmetic skills, aptitude skills, communication skills, self confidence for better employability.
- PO6. Formulates and develops statistical arguments in logical manner.
- PO7. Provide a systematic understanding of the concepts and theories of mathematical and computing their applications in the real world.

##### **Programme Specific Outcomes: (PSO)s of B.Sc. Statistics:**

- PSO 1. Critically evaluation of ideas and arguments by collection of relevant information about the units for study.
- PSO 2. Identify problems and independently propose solutions using creative approaches, acquired through interdisciplinary experiences, and a depth and breadth of knowledge/expertise in the field.
- PSO 3. Accurate interpretation of collected information.

**PSO 4.** Students will be able to apply the scientific method to questions in statistics by formulating testable hypotheses, collecting data that address these hypotheses, and analyzing those data to assess the degree to which their scientific work supports their hypotheses.

**PSO 5.** Students will be able to present scientific hypotheses and data both orally and in writing in the formats that recommended for research.

**PSO 6.** Students will be able to access the primary literature, identify relevant works for a particular topic, and evaluate the scientific content of these works.

**PSO 7.** Students will be able to apply fundamental statistical tools (statistics, calculus) and physical principles (physics, chemistry) to the analysis of relevant biological situations.

#### **Course Outcomes of B.Sc. Statistics :**

After completion of course following learning outcomes are expected.

Students will learn and understand the syllabus.