

**UNIVERSITY OF MUMBAI**  
**No. UG/133 of 2011**

**CIRCULAR:-**

A reference is invited to the Ordinances, Regulations and syllabi relating to the B.Sc. degree course vide this office Circular No. UG/69 of 2011, dated 18<sup>th</sup> April, 2011, and the Principals of the affiliated colleges in Science are hereby informed that the recommendation made by the faculty of Science at its meeting held on 29<sup>th</sup> April, 2011, has been accepted by the Academic Council at its meeting held on 25<sup>th</sup> May, 2011 vide item No. 4.60 and that, in accordance therewith, the syllabus as per the Credit Based Semester and Grading System for First Year of B.Sc. Programme in Statistics is as per Appendix and that the same has been brought into force with effect from the academic year 2011-2012.

MUMBAI – 400 032  
13<sup>th</sup> June, 2011

(Prin. (Dr.) M.S.Kurhade)  
I/c. Registrar

**UNIVERSITY OF MUMBAI**



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

**Program: B.Sc.**

**Course : Statistics**

(Credit Based Semester and Grading System with  
effect from the academic year 2011–2012)

## Semester I

DESCRIPTIVE STATISTICS-1			STATISTICAL METHODS-1		
Course code	Unit	No. of lectures	Course code	Unit	No. of lectures
USST101	I	15	USST102	I	15
	II	15		II	15
	III	15		III	15

Total number of lectures **90** +Notional **90=180** lectures = **4 CREDITS**

### COURSE USST101:

### DESCRIPTIVE STATISTICS-1

<p><b>UNIT – I</b>  <i>Types of Data and Tabulation :</i>            Concepts of statistical population and sample.            Different types of scales nominal, ordinal, interval and ratio.            Types of Data from a population : Qualitative and quantitative data;            Time series data; discrete and continuous data.            Primary data: Concept of a questionnaire and a schedule and distinction between them.            Verification for consistency.            Construction of tables with one, two or three factors of classification.            Independence and Association for 2 X 2 table using Yule’s coefficient of association and coefficient of colligation.            Requirements of good statistical table.</p>	<b>15 Lectures</b>
<p><b>UNIT – II</b>  <i>Graphs ,Diagrams and Bivariate frequency distribution:</i>            Diagrammatic representation using bar diagrams and pie chart.            Univariate frequency distribution of discrete and continuous variables.            Cumulative frequency distribution.            Graphical representation of frequency distribution by Histogram, frequency polygon, Stem and leaf diagram and Cumulative frequency polygon.            Bivariate frequency distribution. Marginal and Conditional frequency distributions.</p>	<b>15 Lectures</b>
<p><b>UNIT – III</b>  <i>Measures of central tendency:</i>            Concept of central tendency or location of data.            Measures of central tendency or location.            Arithmetic mean (simple and weighted), Combined mean, Geometric mean and Harmonic mean.            Median, Quartiles, Deciles, Percentiles.Mode.            Uses of Mean, Medan and Mode their Merits and demerits.            Requirements of good average.</p>	<b>15 Lectures</b>

## COURSE USST102: STATISTICAL METHODS-1

<p><b>UNIT – I</b> <i>Elementary Probability Theory :</i> Trial, random experiment, sample point and sample space. Definition of an event. Operation of events, mutually exclusive and exhaustive events. Classical (Mathematical) and Empirical definitions of Probability, and their properties. Theorems on Addition and Multiplication of probabilities. Independence of events, Conditional probability, Bayes theorem and its applications.</p>	<b>15 Lectures</b>
<p><b>UNIT – II</b> <i>Concept of Discrete random variable and properties of its probability distribution :</i> Random variable. Definition and properties of probability distribution and cumulative distribution function of discrete random variable. Raw and Central moments (definition only) and their relationship. (upto order four without proof). Concepts of Skewness and Kurtosis and their uses. Expectation of a random variable. Theorems on Expectation Variance. Joint probability mass function of two discrete random variables. Marginal and conditional distributions. Theorems on Expectation, Variance, Covariance and Coefficient of Correlation. Independence of two random variables.</p>	<b>15 Lectures</b>
<p><b>UNIT – III</b> <i>Some Standard Discrete Distributions:</i> Discrete Uniform, Binomial and Poisson distributions and derivation of their mean and variance. Recurrence relation for probabilities of Binomial and Poisson distributions (Without derivation). Poisson approximation to Binomial distribution (Statement only).</p>	<b>15 Lectures</b>

## Semester II

DESCRIPTIVE STATISTICS-2			STATISTICAL METHODS-2		
Course code	Unit	No. of lectures	Course code	Unit	No. of lectures
USST201	I	15	USST202	I	15
	II	15		II	15
	III	15		III	15

Total number of lectures **90** +Notional **90=180** lectures = **4 CREDITS**

### COURSE USST201 : STATISTICAL METHODS-1

<p><b>UNIT – I</b>  <i>Measures of dispersion:</i>            Range, Semi-inter quartile range, Mean absolute deviation, Variance, Standard deviation, Combined variance and their relative measures of dispersion.            Raw and Central moments up to fourth order and relationships among them.            Application of Skewness and Kurtosis.            Measures of Skewness and Kurtosis based on moments and quartiles</p>	<b>15 Lectures</b>
<p><b>UNIT – II</b>  <i>Correlation and regression analysis</i>            Scatter Diagram, Product moment correlation coefficient and its properties. Spearman’s Rank correlation.            Concept of linear regression. Principle of least squares.            Fitting a straight line by method of least squares.            Relation between regression coefficients and correlation coefficient.            Fitting of curves reducible to linear form by transformation.            Concept and use of coefficient determination (<math>r^2</math>).            Fitting a quadratic curve by method of least squares. Box-whisker plot.</p>	<b>15 Lectures</b>
<p><b>UNIT – III</b>  <i>Index Numbers.</i>            Index numbers as comparative tool. Stages in the construction of Price Index Numbers.            Measures of Simple and Composite Index Numbers. Laspeyre’s, Paasche’s, Marshal-Edgeworth’s, Drobisch and Bowley’s and Fisher’s Index Numbers formula. Quantity Index Numbers and Value Index Numbers Time reversal test, Factor reversal test, Circular test.            Fixed base Index Numbers, Chain base Index Numbers.            Base shifting, splicing and deflating            Cost of Living Index Number.            Concept of Real Income based on Wholesale Price Index Number.</p>	<b>15 Lectures</b>

## COURSE USST202 : STATISTICAL METHODS-2

<p><b>UNIT – I</b>  <i>Continuous random variable :</i>            Concept of Continuous random variable and properties of its probability distribution            Probability density function and cumulative distribution function. Their graphical representation.            Expectation of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and central moments (simple illustrations).</p>	<p><b>15 Lectures</b></p>
<p><b>UNIT – II</b>  <i>Some Standard Continuous Distributions :</i>            Uniform, Exponential (single or double parameter) and Normal distribution.            Derivations of mean, median and variance for Uniform and Exponential distributions. Properties of Normal distribution (without proof). Normal approximation to Binomial and Poisson distribution (statement only). Properties of Normal curve. Use of normal tables.</p>	<p><b>15 Lectures</b></p>
<p><b>UNIT – III</b>  <i>Elementary topics on Estimation and Testing of hypothesis:</i>            Sample from a distribution :            Concept of a statistic estimate and its sampling distribution. Parameter and it's estimator.            Concept of bias and standard error of an estimator.            Central Limit theorem (statement only).            Sampling distribution of sample mean 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.            Statistical tests :            Concept of hypothesis            Null and alternate hypothesis,            Types of errors, Critical region, Level of significance.            Large sample tests (using central limit theorem, if necessary)            For testing specified value of population mean            For testing specified value in difference of two means            For testing specified value of population proportion            For testing specified value of difference of population proportion (Development of critical region is not expected.)            Use of central limit theorem.</p>	<p><b>15 Lectures</b></p>

## PRACTICALS IN STATISTICS

Total number of lectures 45 +Notional 45= 90 lectures =2 CREDITS

### Distribution of the topics for the Practicals

#### SEMESTER I

**Course code: USSTP1**

Sr. No	(A)	Sr. No	(B)
1	Classification and Tabulation	1	Probability.
2	Analysis of categorical data	2	Discrete Random Variable
3	Graphs and Diagrams	3	Bivariate Probability Distributions.
4	Measures of Central Tendency I	4	Binomial distribution
5	Measures of Central Tendency II	5	Poisson distribution

#### SEMESTER II

**Course code: USSTP2**

Sr. No	(A)	Sr. No	(B)
1	Measures of Dispersion	1	Continuous Random Variables
2	Skewness and Kurtosis.	2	Uniform, Exponential and Normal Distributions
3	Correlation Analysis and Regression Analysis	3	Applications of central limit theorem and normal approximation
4	Curve fitting by the method of least squares	4	Testing of Hypothesis
5	Index numbers	5	Large Sample Tests

#### **REFERENCES .**

1. Medhi J. : Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
2. Agarwal B.L. : Basic Statistics, New Age International Ltd.
3. Spiegel M.R. : Theory and Problems of Statistics, Schaum' s Publications series. Tata McGraw-Hill.
4. Kothari C.R. : Research Methodology, Wiley Eastern Limited.
5. David S. : Elementary Probability, Cambridge University Press.
6. Hoel P.G. : Introduction to Mathematical Statistics, Asia Publishing House.
7. Hogg R.V. and Tannis E.P. : Probability and Statistical Inference. McMillan Publishing Co. Inc.
8. Pitan Jim : Probability, Narosa Publishing House.
9. Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.

### **Internal Assessment of Theory Core Courses**

#### **Per Semester per course**

- |     |   |          |
|-----|---|----------|
| (1) | 2 periodical tests                                      | 20 Marks |
| (2) | One assignment  | 10 Marks |
| (3) | Active participation in class instructional deliveries  | 05 Marks |
| (4) | Overall conduct as a responsible student, mannerism etc | 05 Marks |

### **Internal Assessment of Practical Core Courses**

#### **Per Semester per course**

- |     |  |          |
|-----|--|----------|
| (1) | Semester work, Documentation, Journal  | 05 Marks |
| (2) | Viva   | 05 Marks |
| (3) | For any one or the combinations of the following activities  | 10 Marks |
|     | <ul style="list-style-type: none"><li>• Data collection and /or analysis</li><li>• Assignments using statistical soft wares</li><li>• Case study/project</li><li>• Seminar based on topic preferably not covered in syllabus</li><li>• Industrial visit and its report</li></ul> |          |

### **Semester End Assessment of Theory Courses**

#### **Per Semester per course**

At the end of the semester examination of two hours duration and 60 marks based on three units shall be held.

There shall be four questions of 15 marks, (may carry internal option, not more than 23 marks)

All questions should be compulsory.

### **Semester End Assessment of Practical Courses**

At the end of the semester examination of three hours duration and 60 marks based on three units of each course shall be held.

#### **Workload**

**Theory** : 3 lectures per week per course.

**Practicals**: 3 lecture periods per course per week per batch. All three lecture periods of the practicals shall be conducted in succession together on a single day

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