SIES College of Arts, Science & Commerce
(Autonomous)

Department of Statistics

Faculty: Science
Program: B.Sc.
Course: Statistics

Syllabus for F.Y.B.Sc.
(Credit Based Semester and Grading System with effect from the academic year 2018–2019)

SEMESTER I

THEORY

TITLE OF COURSE	DESCRIPTIVE STATISTICS I			
COURSE CODE	**UNIT**	**TOPICS**	**LECTURES/ WEEK**	**CREDITS**
PAPER I SIUSSTA11	**I**	**TYPES OF DATA AND DATA CONDENSATION**	**1**	**2**
	II	**MEASURES OF CENTRAL TENDENCY**	**1**	
	III	**MEASURES OF DISPERSION, SKEWNESS & KURTOSIS**	**1**	
TITLE OF COURSE	**STATISTICAL METHODS I**			
COURSE CODE	**UNIT**	**TOPICS**	**LECTURES/ WEEK**	**CREDITS**
PAPER II SIUSSTA12	**I**	**ELEMENTARY PROBABILITY THEORY**	**1**	**2**
	II	**DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS**	**1**	
	III	**STANDARD DISCRETE DISTRIBUTIONS**	**1**	

PRACTICAL

COURSE CODE	PRACTICALS BASED ON	LECTURES/ WEEK	CREDITS
SIUSSTAP1	**SIUSSTA11**	**3**	**2**
	SIUSSTA12	**3**	

SEMESTER II

THEORY

TITLE OF COURSE	DESCRIPTIVE STATISTICS II			
COURSE CODE	**UNIT**	**TOPICS**	**LECTURES/ WEEK**	**CREDITS**
PAPER I SIUSSTA21	**I**	**CORRELATION AND REGRESSION ANALYSIS**	**1**	**2**
	II	**TIME SERIES**	**1**	
	III	**INDEX NUMBERS**	**1**	
TITLE OF COURSE	**STATISTICAL METHODS II**			
COURSE CODE	**UNIT**	**TOPICS**	**LECTURES/ WEEK**	**CREDITS**
PAPER II SIUSSTA22	**I**	**CONTINUOUS RANDOM VARIABLES**	**1**	**2**
	II	**STANDARD CONTINUOUS DISTRIBUTIONS**	**1**	
	III	**ESTIMATION AND TESTING OF HYPOTHESIS**	**1**	

PRACTICAL

COURSE CODE	PRACTICALS BASED ON	LECTURES/ WEEK	CREDITS
SIUSSTAP2	**SIUSSTA21**	**3**	**2**
	SIUSSTA22	**3**	

SYLLABUS FOR F.Y.BSc. UNDER AUTONOMY
SEMESTER I
PAPER I

Objectives :

- To be well versed with data collection techniques.
- To effectively use data visualization and summarization techniques to understand data.

Course Code	Title	Credits
SIUSSTA11	**DESCRIPTIVE STATISTICS I**	**2 Credits (45 lectures)**
UNIT I: TYPES OF DATA AND DATA CONDENSATION Types of data: Qualitative and Quantitative data, Time series data and cross section data, discrete and continuous data. Different types of scales: nominal, ordinal, interval and ratio. Concept of population and sample. Census and Sample survey. Relative merits and demerits. Statistical Organizations and their functions (CSO, NSSO). Survey findings. Primary data: Concept of a questionnaire and a schedule. Secondary data: Sources. Case studies illustrating use of Statistics in different sectors. Diagrams: Bar diagrams, Pie diagram Classification and Tabulation of categorical data up to order three. Association of attributes: Yule's coefficient of association (Q), Yule's coefficient of Colligation (Y).		**15 Lectures**
UNIT II: MEASURES OF CENTRAL TENDENCY Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, Frequency curve, Cumulative frequency curves, Stem and leaf diagram. Central tendency of data. Requisites of a good measure of central tendency. Positional averages: Median, Mode, Partition Values: Quantiles. Mathematical averages: Arithmetic mean (Simple mean, trimmed mean, weighted mean, combined mean), Geometric mean, Harmonic mean. Merits and demerits of different measures.		**15 Lectures**
UNIT III: MEASURES OF DISPERSION, SKEWNESS & KURTOSIS Concept of dispersion. Requisites of good measure of dispersion. Absolute measures of dispersion: Range, Quartile Deviation, Mean absolute deviation, Standard deviation and corresponding relative measures of dispersion. Combined variance. Raw & Central moments and relationship between them. Concept of Skewness and Kurtosis: Absolute and Relative measures of Skewness: Karl Pearson's, Bowley's and Measure based on moments. Measure of Kurtosis based on moments. Box &Whisker Plot.		**15 Lectures**

SEMESTER I : PRACTICALS BASED ON COURSE SIUSSTA11

1. Tabulation and Classification of Data
2. Theory of attributes
3. Data Visualization
4. Measures of central tendency I
5. Measures of central tendency II
6. Measures of dispersion I
7. Measures of dispersion II
8. Moments, Measures of Skewness and Kurtosis I
9. Moments, Measures of Skewness and Kurtosis II
10. Use of MS Excel

PAPER II

Objectives :

- To understand the concepts of probability and probability distribution
- To fit an appropriate distribution using MS excel to data sets

Course Code	Title	Credits
SIUSSTA12	**STATISTICAL METHODS I**	**2 Credits (45 lectures)**
UNIT I: ELEMENTARY PROBABILITY THEORY Random experiment, Sample space, Event, Operation of events, mutually exclusive and exhaustive events. Classical (Mathematical), Empirical (Statistical) definitions of Probability and their properties. Subjective probability. Theorems on Addition and Multiplication of probabilities. Independence of events, pair-wise and mutual independence of three events. Conditional probability, Bayes' theorem.		**15 Lectures**
UNIT II: DISCRETE RANDOM VARIABLES AND PROBABILITY DISTRIBUTIONS Concept of discrete random variable. Probability distribution and cumulative distribution function, definition and their properties. Expectation of a random variable. Theorems on Expectation & Variance. Raw and Central moments and their relationships (up to order four). Concepts of Skewness and Kurtosis. Joint (Bivariate) probability distribution of two discrete random variables. Marginal and conditional distributions. Coefficient of Correlation. Independence of two random variables.		**15 Lectures**
UNIT III: STANDARD DISCRETE DISTRIBUTIONS Discrete Uniform, Hypergeometric, Binomial and Poisson distributions: mean, variance and recurrence relation for probability, fitting of distribution. Binomial approximation to Hypergeometric distribution. Poisson approximation to Binomial distribution.		**15 Lectures**

SEMESTER I: PRACTICALS BASED ON COURSE SIUSSTA12

1. Probability
2. Conditional Probability
3. Discrete Probability distributions
4. Bivariate probability distributions
5. Standard Discrete distributions I
6. Standard Discrete distributions II
7. Use of MS Excel

SYLLABUS FOR F.Y.BSc. UNDER AUTONOMY

SEMESTER II
PAPER I

Objectives:

- To understand forecasting techniques to predict future trend in time series
- To understand concept of index numbers to calculate real income and dearness allowance,

Course Code	Title	Credits
SIUSSTA21	**DESCRIPTIVE STATISTICS II**	**2 Credits** **(45 lectures)**
UNIT I: CORRELATION AND REGRESSION ANALYSIS Bivariate frequency distribution, marginal and conditional distribution, Scatter Diagram, Bubble chart. Product moment correlation coefficient and its properties. Spearman's Rank correlation (with and without ties). Linear regression. Fitting a straight line by method of least squares. Coefficient of determination .Relation between regression coefficients and correlation coefficient. Fitting of curves reducible to linear form by transformation. Fitting a quadratic curve by method of least squares.		**15 Lectures**
UNIT II: TIME SERIES Definition of time series. Its components. Models of time series. Exponential Smoothing method. Estimation of trend by: Freehand curve, Method of semi averages, Method of Moving averages, Method of least squares (linear trend only). Merits and demerits of these methods. Estimation of seasonal component by, Method of simple averages, Ratio to moving average method, Ratio to trend method.		**15 Lectures**
UNIT III: INDEX NUMBERS Index numbers as a comparative tool. Stages in the construction of Index Numbers. Simple and Composite Index Numbers. Simple and weighted aggregate index numbers. Simple and weighted average of relatives. Special index numbers: Laspeyre's, Paasche's, Marshal-Edgeworth's, Dorbisch & Bowley's and Fisher's Index Numbers. Quantity Index Numbers and Value Index Number. Time reversal test, Factor reversal test, Circular test. Fixed base Index Numbers, Chain base Index Numbers, Base shifting, Splicing. Cost of living index number, Concept of real income.		**15 Lectures**

SEMESTER II: PRACTICALS BASED ON COURSE SIUSSTA21

1. Correlation analysis
2. Regression analysis
3. Correlation & Regression analysis
4. Curve fitting
5. Time series I
6. Time series II
7. Index number-I
8. Index number-II
9. Use of MS Excel

PAPER II

Objectives:

- To understand the importance of Bell curve and other distributions used in data analysis in industry.
- To assess population characteristics on the basis of sample using estimation and testing theory.

Course Code	Title	Credits
SIUSSTA22	**STATISTICAL METHODS II**	**2 Credits (45 lectures)**
UNIT I: CONTINUOUS RANDOM VARIABLES Definition of continuous random variable, probability density function and cumulative distribution function. Graphical representation and properties. Expectation of a continuous random variable, Properties. Raw and central moments, Relationship between them (up to order 4). Measures of location, dispersion, skewness and kurtosis.		**15 Lectures**
UNIT II: STANDARD CONTINUOUS DISTRIBUTIONS Uniform, Exponential (with location, scale parameter) and Normal distribution. Derivations of mean, median and variance of Uniform and Exponential distribution. Lack of memory property of exponential distribution. Properties of Normal distribution. Use of normal tables. Normal approximation to Binomial and Poisson distribution.		**15 Lectures**
UNIT III: ESTIMATION AND TESTING OF HYPOTHESIS Parameter, statistic, estimator and estimate, sampling distribution, bias and standard error of an estimator. Central Limit theorem (statement only). Sampling distributions of sample mean and sample proportion. (For large sample only) Point and Interval estimate of mean and proportion based on single sample of large size and difference between two means and proportions based on large sample sizes. Null and alternate hypotheses, Simple and composite hypothesis. Type I and II errors, Critical region, Size of the test, Level of significance. Power of the test Applications of Normal Distribution: Tests for specified value of population mean and population proportion. Tests for equality of two population means and population proportions.		**15 Lectures**

SEMESTER II: PRACTICALS BASED ON COURSE SIUSSTA22

1. Continuous distributions
2. Standard Continuous distributions
3. Normal distribution
4. Point and Interval Estimation
5. Large sample tests
6. Demonstration of Central limit theorem (Excel)
7. Use of MS Excel

REFERENCES:

1. Agarwal B.L. (1978). *Basic Statistics*: New Age International Ltd.
2. David S.(1994). *Elementary Probability* : Cambridge University Press.
3. Goon A.M., Gupta M.K.& Dasgupta B. (1968). *Fundamentals of Statistics*, Volume II: The World Press Private Limited, Calcutta.
4. Gupta S.C.& Kapoor V.K.(2007).*Fundamentals of Mathematical Statistics*: Sultan Chand &Sons
5. Gupta S.C.& Kapoor V.K.(2014). *Fundamentals of Applied Statistics*: Sultan Chand & Sons
6. Hoel P.G.(1947). *Introduction to Mathematical Statistics*: Asia Publishing House
7. Hogg R.V. & Tannis E.P.(1977). *Probability and Statistical Inference*: McMillan Publishing Co. Inc.
8. Kothari C.R.(1985). *Research Methodology:* Wiley Eastern Limited.
9. Medhi, J. (2013).*Statistical Methods, An Introductory Text*. Second Edition: New Age International Ltd.
10. Pitan Jim. (1977) .*Probability*: Narosa Publishing House.
11. Spiegel M.R. (1961).*Theory and Problems of Statistics*. Schaum's Publications series: Tata McGraw-Hill.

EXAMINATION PATTERN

Internal Assessment of Theory per Course per Semester

1. Class Test	20 Marks.
2. Project / Assignment / Presentation etc.	20 Marks.

Semester End Theory Examination per Course

At the end of the semester, examination of 2 hours duration and 60 marks based on the three units shall be held for each course.

Pattern of Theory question paper:
There shall be four compulsory questions of 15 marks each (with Internal Option).
Question 1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III. Question 4 based on all three units.

Semester End Practical Examination per Course

1. Journal	10 Marks.
2. Practical Examination	40 Marks.

At the end of the semester, practical examination of 2 hours duration and 40 marks shall be held for each course.

Pattern of Practical question paper:
There shall be four compulsory questions of 10 marks each (with Internal Option).
Question 1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III. Question 4 based on all three units.