Progressive Education Society's

Modern College of Arts, Science and Commerce,

Shivajinagar, Pune 5

(An Autonomous College Affiliated to Savitribai Phule Pune University)

Detailed Syllabus

For B.Sc. Statistics

(2019-20 Course)

(with effect from 2019-20)

Semester 1 (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem xam	Total
CCT-1	19CSStaU101	Descriptive Statistics-I	3	2	40	60	100
CCT-2	19CSStaU102	Discrete probability distributions-I	3	2	40	60	100
CCP-1	19CSStaU103	Statistics Practical – I	4	2	40	60	100
	Total			**6**	**120**	**180**	**300**

Semester II (First Year)

Course Type	Course Code	Course / Paper Title	Hours / Week	Credit	CIA	End Sem	Total
CCT-1	19CSStaU201	Descriptive Statistics-II	3	2	40	60	100
CCT-2	19CSStaU202	Discrete Probability Distribution-II	3	2	40	60	100
CCP-1	19CSStaU203	Statistics Practical –II	-	2	40	60	100
	Total			**6**	**120**	**180**	**300**

Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous),
Shivajinagar, Pune – 5
First Year of B. Sc. Physics (2019 Course)

Course Code: 19ScStaU101
Course Name: Descriptive Statistics - I

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**
Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Objectives:

- The main objective of this course is to acquaint students with some basic concepts in Statistics. They will be introduced to some elementary statistical methods of analysis of data
- To compute various measures of central tendency, dispersion, skewness and kurtosis.
- Studying qualitative (categorical) data

Course Outcomes:

- This course imparts the knowledge about summary measures, correlation between two variables.
- By learning this course students will be able to apply these methods to real life situations, draw valid conclusions and write interpretations.

Course Content :

	Title and content	Lectures
Chapter 1	**Introduction to Statistics**	**2**
	1.1 Meaning of Statistics as a science. 1.2 Importance of Statistics. 1.3 Scope of Statistics: In the field of Industry, Biological sciences, Medical sciences, Economics, Social sciences, Management sciences, Agriculture, Insurance, Information Technology, Education and Psychology. 1.4 Statistical organizations in India and their functions: CSO, ISI, NSSO, IIPS, Bureau of Economics and Statistics. 1.5 Introduction to contributions by Indian Statisticians :P C Mahalnobis P V Sukhatme, C R Rao , V. S. Huzurbazar	
Chapter 2	**Population and Sample**	**4**

	2.1 Types of characteristics: Attributes: Nominal scale, ordinal scale, Likert scale. Variables: Interval scale, ratio scale. Discrete and continuous variables. 2.2 Types of data: (a) Primary data, Secondary data. (b) Cross-sectional data, Time series data, Directional data. 2.3 Data validation, data visualization technique : Heat map, Correlogram, Mosaic plot. 2.4 Notion of a statistical population and sample: Finite population, infinite population, homogeneous population and heterogeneous population. sample and a random sample. 2.5 Methods of sampling (description only): Simple random sampling with and without replacement (SRSWR and SRSWOR), Stratified Random Sampling, Systematic Sampling, Cluster sampling and Two-stage sampling.	
Chapter 3	**Summary Statistics**	14
	3.1 Classification: Raw data and its classification, Ungrouped frequency distribution, grouped frequency distribution, cumulative frequency distribution, inclusive and exclusive methods of classification, open end classes, relative frequency distribution. 3.2 **Measures of Central Tendency** Concept of central tendency of statistical data, Statistical averages, characteristics of a good statistical average. Arithmetic Mean (A.M.): Definition, effect of change of origin and scale, combined mean of a number of groups, merits and demerits, trimmed arithmetic mean. Mode and Median: Definition, merits and demerits. Empirical relation between mean, median and mode. Partition values: Quartiles, Deciles and Percentiles. Geometric Mean (G.M.): Definition, merits and demerits. Harmonic Mean (H.M.): Definition, merits and demerits. Order relation between arithmetic mean, geometric mean, harmonic mean. Weighted Mean: weighted A.M., G.M. and H.M. Situations where one kind of average is preferable to other. 3.3 **Measures of Dispersion** Concept of dispersion, characteristics of good measure of	

	dispersion. Range, Semi-interquartile range (Quartile deviation): Definition, merits and demerits. Mean deviation: Definition, merits and demerits, minimality property (without proof) Variance and standard deviation: Definition, merits and demerits, effect of change of origin and scale, combined variance for n groups (derivation for two groups). Mean squared deviation: Definition, minimality property of mean squared deviation. Measures of dispersion for comparison: Coefficient of range, coefficient of quartile deviation and coefficient of mean deviation, coefficient of variation(C.V.).	
Chapter 4	**Moments, Skewness and Kurtosis**	9
	4.1 Moments:Raw moments (m'_r) for ungrouped and grouped data. Central moments (m_r) for ungrouped and grouped data, Effect of change of origin and scale. Relations between central moments and raw moments upto 4^{th} order (with proof). 4.2 Concept of skewness of frequency distribution, positive skewness, negative skewness, symmetric frequencydistribution and its relation with central tendency. Bowley's coefficient of skewness :Bowley's coefficient of skewness lies between -1 to 1, interpretation using box and whisker plot. Karl Pearson's coefficient of skewness. Measures of Skewness based on moments(β_1,γ_1). 4.3 Concepts of kurtosis, Types of kurtosis: Leptokurtic, Mesokrtic and Platykurticfrequency distributions and its relation with dispersion. Measures of kurtosis based on moments(β_2,γ_2). 4.4 Properties of β_1 and β_2 (i) $\beta_2 \geq 1$ (ii) $\beta_2 \geq \beta_1+1$	
Chapter 5	**Theory of Attributes**	6

	5.1 Attributes: Classification, notion of manifold classification, dichotomy, class frequency, order of a class, positive class frequency, negative class frequency, ultimate class frequency, relationship among different class frequencies (up to three attributes), and dot operator to find the relation between frequencies, fundamental set of class frequencies. 5.2 Consistency of data up to 3attributes. 5.3 Concepts of independence and association of two attributes 5.4 Yule's coefficient of association (Q), $-1 \leq Q$ 1, interpretation.	
Chapter 6	**Experiential Earning**	1

References:

1. Dr.Dixit P.G, Dr.Prayag V.R., Kapre P.S.Descriptive Statistics,Niraliprakashan., Pune
2. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, NewDelhi.
3. Mukhopadhyay P. (2015). Applied Statistics,Publisher: Books & Allied (*P*) Ltd.
4. Agarwal, B. L. (2003). Programmed Statistics, 2nd Edition, New Age International Publishers, NewDelhi.
5. Das (2009). Statistical Methods, Tata Mcgraw Hill Publishing.
6. Goon, A. M., Gupta, M. K. and Dasgupta, B. (2016). Fundamentals of Statistics, Vol. 1, 6th Revised Edition, The World Press Pvt. Ltd., Calcutta.
7. Gore.Anil, Pranjapesharayu ,KulkarniMadhav. Statistics for everyone.SIPFAcadamy publisher,Nashik
8. Krzanowski (2007). Statistical Principals and Techniques in Scientific and Social Research, Oxford University Press Inc., New York.
9. Mohanty (2016). Basic Statistics, Scientific Publisher
10. Purohit, S. G., Gore S. D., Deshmukh S. R. (2008). Statistics Using R, Narosa Publishing House, NewDelhi.
11. Rastogi (2015). Biostatistics, 3rd Edition, Publisher Medtec
12. Robert S. Witte, John S. Witte (2017). Statistics, Publisher: Wiley
13. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers (1998). Probability and Statistics for Engineers and Scientists, Publisher, Prentice Hall.
14. Snedecor G. W. and Cochran W. G.(1989). Statistical Methods, Eighth Ed. East-WestPress.Wayne (2004). Biostatistics, 7th edition, Publisher: Wiley.

Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous), Shivajinagar, Pune – 5

First Year of B. Sc. Physics (2019 Course)

Course Code: 19ScStaU102

Course Name: Discrete Probability Distribution - I

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Objectives: To introduce to students

- The basic concepts of probability, axiomatic approach of probability, concept of independence of two events, conditional probability and Bayes' law
- The concept of random variable and univariate probability distribution.
- The concept of independence of study variables involved.
- Standard discrete probability distributions based on finite sample space.

Course Outcomes: At the end of the course students are expected to

- Distinguish between random and non random experiments.
- Study the concept of probability of event
- Identify random variable(s) of interest in different real life situations and find probability distribution of these variables

Course Content:

	Title and content	Lectures
Chapter 1	**Review of Permutations and combinations, probability**	**7**
	1.1 Experiments/Models, deterministic and non- deterministic models. Random experiment, concept of statistical regularity. 1.2 Definitions of - (i) Sample space, (ii) Discrete sample space: finite and countably infinite, (iii) Continuous sample space , (iv) Event, (v) Elementary event, (vi) Complement of an event,	

	(vii) Certain event, (viii) Impossible event. 1.3 Concept of occurrence of an event. 1.4 Algebra of events and its representation in set theory notation. 1.5 Classical definition of probability and its limitations. 1.6 Probability model, equiprobable and non-equiprobable sample space. 1.7 Axiomatic definition of probability, theorems on probability, proofs based on axiomatic definition , computation of probability of an event	
Chapter 2	**Conditional probability, Independence and Bayes'Theorem**	**7**
	2.1 Conditional probability of an event. 2.2Independence of two events. 2.3 Pair-wise independence and mutual independence for three events. 2.4 Multiplication theorem $P(A \cap B) = P(A) \cdot P(B\|A)$ and its generalization. 2.5 Partition of the sample space. 2.6 Proof of Bayes' theorem, Applications of Bayes' theorem in real life.	
Chapter 3	**Univariate Probability Distributions**	**12**
	3.1 Concept and definition of a discrete random variable. 3.2 Probability mass function (p.m.f.) and distribution function (d.f.),$F_X(\cdot)$, of discrete random variable, Characteristic properties of distribution function. 3.3 Mode and median of a univariate discrete probability distribution. 3.4 Definition of expectation (mean) of a random variable, properties of expectation, expectation of a function of a random variable, moment generating function (m.g.f.) and cumulant generating function(c.g.f.) and their properties. 3.5 Definitions of variance, properties of variance, standard deviation (s.d.) and coefficient of variation (c.v.) of univariate probability distribution 3.6 Definition of raw, central moments and factorial raw	

	moments of univariate probability distributions and their interrelations. 3.7 Coefficients of skewness and kurtosis based on moments. 3.8 Examples and Problems.	
Chapter 4	**Discrete Probability Distributions based on finite sample space-I**	**9**
	4.1Degenerate distribution (one point distribution) Pmf: P(X=c) =1, mean and variance. 4.2 Uniform discrete distribution on integers 1 to n: p.m.f.P(X=x) $= \begin{cases} \frac{1}{n} & , x = 1, 2, \cdots, n. \\ 0 & \text{otherwise.} \end{cases}$ mean, variance, M.G.F, distribution of sum of two discrete uniform random variable 4.3 Bernoulli distribution: p.m.f. $P(X = x) = \begin{cases} p^x (1-p)^{1-x} & , x = 0,1 \\ & 0 < p < 1 \\ 0 & \text{otherwise} \end{cases}$ mean,variance ,M.G.F. and moments. Distribution of sum of two independent Bernoulli random variable.	
Chapter 5	**Experiential Earning**	**1**

References:

1. Dr.Dixit P.G, Dr.Prayag V.R., Kapre P. S. .Discretr probability and Probability distributions, Niraliprakashan., Pune
2. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, NewDelhi.
3. Hogg,R.V.andCraigR.G.(1989).IntroductiontoMathematicalStatistics, MacMillan Publishing Co., NewYork.
4. Agarwal B. L. (2003). Programmed Statistics, 2nd edition, New Age International Publishers, NewDelhi.
5. B.L.S. Prakasarao, (2008). A First Course in Probability and Statistics, World Scientific Publishing Company.
6. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, NewYork.
7. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the

Theory of Statistics, 3rd edition, McGraw Hill BookCompany.
8. Ross S. (2002). A First Course in Probability, 6th edition, Pearson Education, Inc. & Dorling Kindersley Publishing,Inc.
9. Roussas, George G. (2016). First course in mathematical statistics.2nd edition Publisher: AcademicPress.
10. Walpole and Myres, (1986). Mathematical Statistics,4th edition, Publisher: Longman Higher Education.

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Progressive Education Society's
Modern College of Arts, Science and Commerce (Autonomous),
Shivajinagar, Pune – 5
First Year of B. Sc. Physics (2019 Course)

Course Code: 19ScStaU103
Course Name: Statistics Practical

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**
Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisites: Knowledge of the topics in theory papers I and II.

Course Outcome: At the end of this course students are expected to be able

- To use various graphical and diagrammatic techniques and interpret.
- To compute various measures of central tendency, dispersion, skewness and kurtosis.
- To compute correlation coefficient.
- To analyse data pertaining to discrete and continuous variables and to interpret the results,
- To compute probabilities of univariate distributions,
- To interpret summary statistics of output generated by Computer Software.
- To summarize and analyze the data using Computer Software.

	Title of Experiment/ Practical
1	Diagrammatic and Graphical representation of statistical data.
2	Tabulation and Data interpretation.
3	Use of random number tables to draw SRSWOR, SRSWR, stratified sample and systematic sample
4	Computation of measures of central tendency and dispersion (ungrouped data). Use of an appropriate measure and interpretation of results and computation of partition values
5	Computation of measures of central tendency and dispersion (grouped data). Use of an appropriate measure and interpretation of results and computation of partition values.
6	Measures of skewness and kurtosis, Box plot
7	Attributes

8	Graphical and diagrammatic representation of statistical data using R
9	Use of random numbers to draw SRSWOR, SRSWR, Stratified sample and systematic sample using MS Excel
10	Computation of summary statistics using MS Excel

Progressive Education Society's

Modern College of Arts, Science and Commerce (Autonomous), Shivajinagar, Pune – 5

First Year of B. Sc. Physics (2019 Course)

Course Code: 19ScStaU201

Course Name: Descriptive Statistics - II

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**

Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Objectives:

- The main objective of this course is to acquaint students with some concepts in Statistics.
- They will be introduced to some statistical methods of analysis of data:
  - To compute the correlation coefficient for bivariate data and interpret it.
  - Fitting linear regression model to the bivariate data.
  - Fitting second degree and exponential curves to bivariate data. .
  - Computing various index numbers and their interpretation.

Course outcomes:

- This course imparts the knowledge about correlation and regression analysis for bivariate and index numbers and analysis of qualitative data.
- By learning this course students will be able to apply these methods to real life situations, draw valid conclusions and their interpretations.

Course Content:

	Title and content	lectures
Chapter 1	**Correlation**	**9**
	1.1 Bivariate data, Scatter diagram andinterpretation. 1.2 Concept of correlation between two variables, positive correlation, negative correlation, nocorrelation. 1.3 Covariance between two variables (m11) : Definition, computation, effect of change of origin andscale. 1.4 Karl Pearson's coefficient of correlation (r) : Definition, Properties: (i) $-1 \leq r \leq 1$ (with proof), (ii) Effect of change of origin and scale	

	(withproof). computation for ungrouped data and grouped frequency distributed data with interpretation. 1.5 Spearman's rank correlation coefficient: Definition, derivation of formula, computation and interpretation (without ties). In case of ties, compute Karl Pearson's correlation coefficient between ranks. (Spearman's rank correlation coefficient formula with correction for ties not expected.)	
Chapter 2	**Regression**	**12**
	2.1 Meaning of regression, difference between correlation and regression. 2.2 Concept of error in regression, error modeled as a continuous random variable. Simple linear regression model: $Y= a + b X + \varepsilon$, where ε is a continuous random variable with $E(\varepsilon) =0$, $V(\varepsilon) = \sigma^2$. Estimation of a, b by the method of least squares.Interpretation of parameters.Statement of the estimator of σ^2. Concept of residual, plot of residual against X, concept of coefficient of determination. Concept of missing data and outlier.	
Chapter 3	**Curve fitting**	6
	3.1 Fitting of second degree curve ($Y = a + b X + cX^2$), 3.2 Fitting of exponential curves of the type $Y = a b^X$ and $Y = aX^b$.In all these curves, constants are estimated by the method of least squares.	
Chapter 4	**Index Numbers**	8
	4.1 Introduction of index numbers. 4.2 Definition and meaning. 4.3 Problems/considerations in the construction of index numbers. 4.4 Simple and weighted price index numbers based on price relatives. 4.5 Simple and weighted index numbers based on	

	aggregates. 4.6 Laspeyre's,Paasche's and Fisher's Index numbers. 4.7 Time reversal Test, factor reversal test, circular test. 4.8 Consumer price index number: Considerations in its construction. 4.9 Methods of construction of consumer price index number: (i) Family budget method (ii) Aggregate expenditure method. 4.10 Base shifting and deflating.	
Chapter 5	**Experiential Earning**	1

References:

1. Dr.Dixit P.G, Dr.Prayag V.R., Kapre P. S. .Discretr probability and Probability distributions, Niraliprakashan., Pune
2. Gupta, S. C. and Kapoor, V. K. (1997). Fundamentals of Applied Statistics, 3rd Edition, Sultan Chand and Sons Publishers, NewDelhi.
3. Hogg,R.V.andCraigR.G.(1989).IntroductiontoMathematicalStatistics, MacMillan Publishing Co., NewYork.
4. Agarwal B. L. (2003). Programmed Statistics, 2nd edition, New Age International Publishers, NewDelhi.
5. B.L.S. Prakasarao, (2008). A First Course in Probability and Statistics, World Scientific Publishing Company.
6. Hoel P. G. (1971). Introduction to Mathematical Statistics, John Wiley and Sons, NewYork.
7. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, 3rd edition, McGraw Hill BookCompany.
8. Ross S. (2002). A First Course in Probability, 6th edition, Pearson Education, Inc. & Dorling Kindersley Publishing,Inc.
9. Roussas, George G. (2016). First course in mathematical statistics.2ndedition Publisher: AcademicPress.
10. Walpole and Myres, (1986). Mathematical Statistics,4th edition, Publisher: Longman Higher Education.

Course Code: 19ScStaU202
Course Name: Descriptive Discrete Probability Distribution - II

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**
Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Objectives: The main objective of this course is to acquaint students with:

- The concept of two dimensional discrete random variable and bivariate probability distribution.
- Discrete probability distributions based on countably infinite sample space.
- Interrelations between these distributions.
- Introduction to continuous probability distributions.

Course outcomes: At the end of the course the students are expected to:

- Identify different real life situations where standard discrete probability distributions can be applied.
- Identify limiting distributions.
- Compute probabilities for different standard discrete and continuous probability distributions

Course Content:

	Title and content	lectures
Chapter 1	**Discrete Probability Distributions based on finite sample space-II**	**9**
	1.1 Binomial distribution:p.m.f. $P(X = x) = \begin{cases} \binom{n}{x} p^x q^{(n-x)} & , x = 0,1,\ldots,n. \\ & ,0 < p < 1 \quad , q = 1-p \\ 0 & \text{otherwise.} \end{cases}$ Notation : X ~B(n,p). , situations where this distribution is applicable. 1.1 mean, variance, recurrence relation for successive probabilities, computation of probabilities of different events, mode	

	of the distribution, m.g.f., c.g.f., moments , skewness (comments when $p = 0.5$, $p > 0.5$, $p < 0.5$), additive property. 1.2 Fitting of binomial distribution. 1.3 Hypergeometric Distribution :p.m.f $P(X = x) = \begin{cases} \dfrac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}} & , x = 0, 1, \cdots\cdots \min\{n, M\},\ N > M \\ 0 & \text{otherwise} \end{cases}$ Notation : $X \sim H(N, M, n)$, situations where this distribution is applicable 1.4 mean and variance, binomial approximation to hypergeometric distribution.Computation of probability, 1.5 Examples and problems.	
Chapter 2	**Bivariate discrete probability distribution**	**12**
	2.1 Definition of two-dimensional discrete random variable, its joint p.m.f. and its distribution function and their properties, concept of identically distributed random variables. 2.2 Computation of probabilities of events in bivariate probability distribution. 2.3 Concepts of marginal and conditional Probability distributions. 2.4 Independence of two discrete random variables based on joint and marginal p.m.f. 2.5 Definition of raw and central moments. 2.6 Theorems on expectations of sum and product of two jointly distributed random variables. 2.7 Conditional expectation. 2.8 Definitions of conditional mean and Conditional variance. 2.9 Definition of covariance, coefficient of correlation, 2.10 Variance of linear combination of variables i.e. Var(aX +bY). 2.11 Examples and Problems.	

	2.12 Illustrations of some standard bivariate probability distributions 2.13 Conditional distribution of X given (X+Y) for binomial distribution. 2.14 Examples and problem	
Chapter 3	**Univariate discrete probability distributions based on countably infinite sample space.**	**14**
	3.1 **Poisson distribution**: Notation : $X \sim P(\lambda)$. $p(x) = \begin{cases} \frac{e^{-\lambda}\lambda^x}{x!}, & x = 0,1,2 \ldots\ldots, \ \lambda>0 \\ 0 & \text{otherwise} \end{cases}$ Situations where this distribution isapplicable. Mean, variance and m.g.f, and c.g.f. , moments using c.g.f., skewness ,kurtosis, recurrence relation, conditional distribution X | X + Y , additive property, Poisson distribution as a limiting form of binomial distribution 3.2 **Geometric distribution**: Notation: $X \sim G(p)$, Geometric distribution on support (0, 1, 2…) , with p.m.f. $p(x) = \begin{cases} pq^x, & x = 0, 1, 2\ldots, 0 < p < 1, \\ & q = 1 - p. \\ 0 & \text{otherwise} \end{cases}$ Geometric distribution on support (1,2,..) with p.m.f. $p(x) = \begin{cases} pq^{x-1}, & x = 1, 2\ldots \ 0 < p < 1, \\ & q = 1 - p. \\ 0 & \text{otherwise} \end{cases}$ distribution function, recurrence relation, situations where this distribution isapplicable. mean, variance, m.g.f, c.g.f.,moments , lack of memory property. Fitting of geometric distribution. 3.4 Examples and problems	
Chapter 4	**Experiential Earning**	1

References:

1 Agarwal B. L. (2003). Programmed Statistics, 2nd edition, New Age International Publishers, NewDelhi.

2. B.L.S. Prakasarao, (2008). A First Course in Probability and Statistics, World Scientific Publishing Company

3. Gupta, S.C. and Kapoor, V. K. (1983). Fundamentals ofMathematical Statistics, 8th Edition, Sultan Chand and Sons Publishers, New Delhi.

4. Hogg, R. V. and Craig R. G. (1989). Introduction to Mathematical Statistics, MacMillan Publishing Co., NewYork.
5. Lefebvre Mario (2006) Applied probability and Statistics, PublisherSpringer
6. Mayer, P. (1972). Introductory Probability and Statistical Applications, Addison Wesley Publishing Co.,London.
7. Mood, A. M. and Graybill, F. A. and Boes D.C. (1974). Introduction to the Theory of Statistics, 3rd edition, McGraw Hill BookCompany.
8. Mukhopadhyay P (2006) Mathematical Statistics Books & Allied (*P*) Ltd.
9. Rohatgi (2011). An Introduction to Probability and Statistics, Willey publications.
10. Ross S. (2002). A First Course in Probability, 6th edition, Pearson Education, Inc. & Dorling Kindersley Publishing,Inc.

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First Year of B. Sc. Physics (2019 Course)

Course Code: 19ScStaU203
Course Name: Statistics Practical

Teaching Scheme: TH: 3 Lectures /Week **Credit: 02**
Examination Scheme: CIA: 40 Marks **End-Sem: 60 Marks**

Pre-requisites: Knowledge of the topics in theory papers I and II.

Course Outcome: At the end of this course students are expected to be able

- To use various graphical and diagrammatic techniques and interpret.
- To compute various measures of central tendency, dispersion, skewness and kurtosis.
- To compute correlation coefficient.
- To analyse data pertaining to discrete and continuous variables and to interpret the results,
- To compute probabilities of univariate distributions,
- To interpret summary statistics of output generated by Computer Software.
- To summarize and analyze the data using Computer Software.

	Title of Experiment/ Practical
1	Scatter diagram, correlation coefficient (ungrouped data) Fitting of line of regression, residual plot
2	Fitting of second degree curve, exponential curve of type $y = ab^x$, $y = a^xb$, finding the best fit using mean residual s.s. and coefficient of determination Simple linear regression grouped .
3	Scatter diagram, correlation coefficient, fitting a line of regression, fitting of second degree curve, using MS Excel
4	Fitting of binomial distribution and computation of expected frequencies
5	Fitting of Poisson distribution and computation of expected frequencies
6	Applications of binomial and hypergeometric distributions
7	Applications of Poisson and geometric distributions
8	Model sampling from Poisson and binomial distributions
9	Index numbers.
10	Bivariate probability distribution
11	Project