Sri G.V.G Visalakshi College for Women (Autonomous)
Affiliated to Bharathiar University
Department of Statistics
Syllabus having direct bearing on Employability
B.Sc. Statistics
Semester I
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III: Core I Descriptive Statistics - I	Course Code: 117W01
Semester: I	**No. of Credits: 4**
No. of hours : 60 (Total hours)	**C:T: 52:8**
CIA Max. Marks: 25	**ESE Max. Marks: 75**

(C: Contact hours, T: Tutorial)
Course Objectives:
- to impart the basic measures of statistics
- to provide a strong foundation in basic descriptive measures such as measures of central tendency, dispersion and skewness.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Demonstrate the ability to apply fundamental concepts in exploratory data analysis.	U
CO2	Classify and present the data	R
ÇO3	Interpret examples of methods for summarizing data set which are most appropriate to highlight interesting features of the data.	U
CO4	Construct and interpret graphical summaries of data.	A
CO5	Compute the descriptive measures and its dispersion	U
CO6	Fit curves transformable to the form of least square.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I	(11 Hours)
Origin, scope, limitations and misuse of Statistics – Collection – Classification – Tabulation of data. Diagrammatic representation of data: one dimensional and two dimensional diagrams – graphic representation: line diagram, frequency polygon, frequency curve, histogram and Ogive curves. Book 1: Chapter 1, Chapter 2: (Sections 2.2 & 2.3).	

Unit II	(11 Hours)

Measures of central tendency: Mean, Median, Mode, Geometric mean and Harmonic mean – Partition values: Quartiles, Deciles and Percentiles – Measures of Dispersion: Mean deviation, Quartile deviation and Standard deviation – Coefficient of variation.
Book 1: Chapter 2: (Sections 2.4 – 2.14)

Unit III	(10 Hours)

Moments – measures of Skewness – Pearson's and Bowley's Coefficient of skewness, Coefficient of Skewness based on moments – Kurtosis.
Book 1: Chapter 2: (Sections 2.15 – 2.17)

Unit IV	(10 Hours)

Curve fitting: principle of least squares, fitting of the curves of the form y = a+ bx, $y = a + bx + cx^2$ and curves transformable to the above form.
Book 2: Chapter 2: (Section 2.4.3)

Unit V	(10 Hours)

 Case study and problems relating to all the above units.

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – III	Fundamentals of Mathematical Statistics	Gupta. S.C and Kapoor. V.K	Sultan Chand & Sons, 2016 Reprint
IV	Fundamentals of Applied Statistics	Gupta. S.C and Kapoor. V.K	Sultan Chand & Sons, 2017 Reprint

Book for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Statistical Methods – Part I	Mills. F.C.	Pitman Publishing, 1965

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. G. Uma	Dr. G.Uma
Head of the Department :		

B.Sc. Statistics
Semester I
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III: Core II: Descriptive Statistics – II	**Course Code: 117W02**
Semester: I	**No. of Credits: 4**
No. of hours :60 (Total hours)	**C:T: 52:8**
CIA Max. Marks: 25	**ESE Max. Marks:75**

(C: Contact hours, T: Tutorial)

Course Objectives:

- to enable the students to effectively use bivariate measures such as correlation and regression for data analysis.
- to make the students demonstrate the association of attributes and its measures.
- to provide basic concepts in probability and operations with theorems.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Associate the data and find its measure.	**U**
CO2	Fit the line of best fit and its coefficient.	**A**
ÇO3	Measure the dependence and independence of data by method of attributes.	**U**
CO4	Recognize the degree of uncertainty that is involved before making important decisions.	**R**
CO5	Interpret the success or failure in terms of probability conditions.	**U**
CO6	Use an appropriate statistical tool for data summary and exploratory data analysis	**A**

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I	**(10 Hours)**
Linear correlation – scatter diagram, Pearson's coefficient of correlation, correlation in a bivariate table, Rank correlation, Coefficient of concurrent deviation – Regression equations – properties of regression coefficients. Chapter 10, Chapter 11: (Section 11.2)	

Unit II	**(11 Hours)**
Association of attributes: Relation between class frequencies, consistency of data, independence of attributes, criterion of independence, association of attributes: Yule's coefficient of association, Yule's coefficient of colligation. Chapter 13	

Unit III	(11 Hours)
Probability: Sample Space – Concepts of events – Algebraic Operations on events – Definitions of probability. Chapter 3: (Sections 3.2, 3.7 & 3.8)	

Unit IV	(10 Hours)
Generalized addition and compound Theorems of probability – independent events – Conditional probability – Baye's Theorem. Chapter: 3 (Sections 3.9.1, 3.12 & 3.13) Chapter 4 (Section 4.2)	

Unit V	(10 Hours)
Case study and problems related to all the above units.	

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I -V	Fundamentals of Mathematical Statistics	Gupta. S.C and Kapoor V.K	Sultan Chand & Sons, 2017 Reprint

Book for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Statistical Methods – Part I	Mills. F.C.	Pitman Publishing, 1965

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

B.Sc. Statistics
Semester II
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III: Core III: Applied Statistics	Course Code: 217W03
Semester: II	No. of Credits: 4
No. of hours :90 (Total hours)	C:T: 75:15
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:
- to introduce time series to enable the students to forecast the data relating to economics and business.
- to demonstrate the use of index numbers in solving problems.
- to provide a strong foundation in basic demographic measures.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Formulate methods for using time series analysis for addressing business problems.	A
CO2	Define price and quality indices and construct price, quantity and value indexes.	R
ÇO3	Predict future values for the present data by various techniques of time series analysis.	A
CO4	Identify and compare the advantages and disadvantages of the different sources of Demographic data.	R
CO5	Describe the distribution of a population using various demographic characteristics.	R
CO6	Present appropriate techniques to ensure comparability of the measures across the birth population	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I : Time series	(15 Hours)
Concept – components of time series – additive and multiplicative models – Resolving components of a time series – measuring trend: Graphic, semi – averages, moving average and principle of least squares methods. Chapter 2: (Sections 2.1 - 2.4.6)	

Unit II Time series	(15 Hours)
Seasonal variation – measuring seasonal variation: method of simple averages, ratio to trend method, ratio to moving average method and link relative method – Cyclical and Random fluctuations – variate difference method. Chapter 2: (Sections 2.5, 2.6 & 2.9)	

Unit III Index Numbers	(15 Hours)
Index numbers and their definitions – construction and uses of fixed and chain based index numbers – simple and weighted index numbers – Laspeyre's, Paache's, Fisher's, and Marshall- Edgeworth index numbers – optimum tests for index numbers – Cost of living index numbers. Chapter 3: (Sections 3.1 – 3.5)	

Unit IV Demographic methods	(15 Hours)
Demography – definition – sources of demographic data: vital registration – population census – population register – demographic surveys – population data as aid to social, economic and healthy planning – process of Indian Civil registration and census. Chapter 9: (Sections 9.1 – 9.3)	

Unit V Demographic methods	(15 Hours)
Fertility measurements: Fertility as a component of population change – crude birth rate – general, specific and total fertility rates – gross and net reproduction rates and their interpretation. Chapter 9: (Sections 9.7 & 9.8)	

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I -V	Fundamentals of Applied Statistics	Gupta S.C and Kapoor, V.K,	Sultan Chand & Sons, 2017 Reprint.

Books for Reference:

S.No.	Name of the Book	Authors	Publishers with Edition
1	Applied General Statistics	Croxton, F.E and Cowden, D.J	Prentice Hall, 3rd Edition, 1967.
2	Fundamentals of Applied Statistics	Gun.A.M, Gupta.M.K and Das Gupta	World Press, 2018 Reprint.
3	The Advanced Theory of Statistics - Vol.III	Kendall.M.G and Alan Stuart.	Macmillan Pub Co, 4th Edition, 1983

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

B.Sc. Statistics
Semester III
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core IV Demographic Methods	Course Code: 317W04
Semester: III	No. of Credits: 4
No. of hours : 45 (Total hours)	C:T: 39:6
CIA Max. Marks: 25 Marks	ESE Max. Marks: 75 Marks

(C: Contact hours, T: Tutorial)

Course Objectives:
- to create awareness about the core social demographic variables such as mortality, migration.
- to provide skills to construct life tables and to calculate survival rates.
- to illustrate the influence of the demographic variables on population growth, composition and projection.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Construct and analyze simple and abridged life tables.	**A**
CO2	Project a population using appropriate equations and assumptions.	**A**
ÇO3	Recognize and analyze typical demographic patterns arising from the data.	**R**
CO4	Describe basic demographic indicators and elaborate on their computation and interpretation	**R**
CO5	Interpret the data base on which are built population projections and work force projections.	**U**
CO6	Estimate the rate of change in a population.	**U**

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I	(8 Hours)

Mortality Measurements: Crude Death Rate – Specific Death Rates – Standardized Death Rates – direct and indirect methods.
Book 1: Chapter 9: (Sections 9.4.1 – 9.4.3)

Unit II	(8 Hours)

Comparative Mortality Index – Infant Mortality Rate – Maternal Mortality Rate – cause – of – Death Rate – case fatality rate – force of mortality – graduation of mortality rates – Gompertz and Makeham's laws.
Book 1: Chapter9: (Sections 9.4.3, 9.5.4 & 9.9)

Unit III	(7 Hours)

Assumptions, Description and Construction of Various columns of a life table and their Relationships – Uses of a life table – Age pyramid.
Book 1: Chapter 9: (Sections 9.5, 9.5.5 & 9.5.6)

Unit IV	(8 Hours)

Construction of an Abridged life table – Reid and Merrell Method – Greville's Method – Migration – Factors Effecting Migration – Gross and Net Migration Rates.
Book 1 Chapter 9: (Sections 9.6, 9.6.1 & 9.6.2)
Book 2: Chapter 10 (fully)

Unit V	(8 Hours)

Population Projection – Population Estimates and Projection – Arithmetic, Geometric and Exponential growth rates – Logistics curves – Pearl and Reed method – method of Rhodes – Basic ideas of stationary and stable population.
Book 1: Chapter9: (Sections 9.5.1 & 9.5.2)

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I - III, IV & V	Fundamentals of Applied Statistics	Gupta.S.C and Kapoor.V.K,	Sultan Chand & Sons, 2017 Reprint
IV	Principles of Population Studies	Asha A.Bende and Tara Karitkar	Himalaya publishing, 2006 Reprint.

Books for Reference:

S. No.	Name of the Book	Authors	Publisherswith Edition
1.	Fundamentals of Statistics	Gun A.M, Gupta.M.K and Das Gupta	World Press, Calcutta, 2018 Reprint
2.	An introduction to the study of population	Bhaskar D. Misra	South Asian Publishers, 1982

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc. Statistics
Semester III
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Non-Major Elective Statistical Analysis	**Course Code: 317NSA**
Semester: III	**No. of Credits: 2**
No. of hours : 30 (Total hours)	**C:T: 26:4**
CIA Max. Marks: 50	**ESE Max. Marks: -**

(C: Contact hours, T: Tutorial)

Course Objectives:
- to expose the history of Statistics
- to provide a base in various statistical descriptive measures
- to enable the use of simple statistical tools in analyzing real time data.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Identify the history and applications of statistics in various fields.	**R**
CO2	Demonstrate the ability to apply various statistical tools in data analysis.	**U**

ÇO3	Interpret the data using various kinds of charts and diagrams.	U
CO4	Evaluate and analyze methods for examining central tendencies and dispersion.	A
CO5	Measure the degree of relationship between the variables.	U
CO6	Predict and forecast the relationship among the variables.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(8 Hours)

Origin, Scope, Limitations and Misuse of Statistics – Collection – Classification – Tabulation of data.
Chapter 1 (Page No. 2 – 23), Chapter 3(Page No. 40 – 52), Chapter 5(Page No. 92 -126)

Unit II	(7 Hours)

Diagrammatic representation of data: one dimensional and two dimensional diagrams – graphic representation: line diagram, frequency polygon, frequency curve, histogram and Ogive curves.
Chapter 6(Page No. 128 – 176)

Unit III	(6 Hours)

Measures of Central Tendency: Mean, Median, Mode, Geometric mean and Harmonic mean – Partition values: Quartiles, Deciles and Percentiles
Chapter 7(Page No. 178 – 270)

Unit IV	(7 Hours)

Measures of Dispersion: Mean deviation, Quartile deviation and Standard deviation – Coefficient of variation.
Chapter 8(Page No. 272 – 335)

Unit V	(7 Hours)

Correlation: Types of correlation – Regression – Properties of regression coefficients.
Chapter 10(Page No. 390 – 450), Chapter 11(Page No. 452 – 470)

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Statistical Methods	S.P. Gupta	Sultan Chand & Sons, 2016 Reprint

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core VII Statistical Inference - I	Course Code: 517W07
Semester: V	No. of Credits: 4
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:
- to generate the contingency tables.
- to provide a strong foundation in point estimation and interval estimation, and their properties.
- to enable the students to draw conclusions about the populations using the computed value of the parameters.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Construct contingency tables to test independence and homogeneity of the samples	A
CO2	Demonstrate approaches to include a measure of accuracy for estimation procedures.	U
ÇO3	Formulate estimators and test procedures based on point estimation.	A
CO4	Find the Cramer-Rao lower bound for the variances of unbiased estimators.	U
CO5	Compute confidence interval and confidence limit for a population parameter.	U
CO6	Analyze and interpret real time empirical data.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(13 Hours)

Order Statistics – Cumulative Distribution Function of a Single Order Statistic – Probability Density Function of a Single Order Statistic – Joint p.d.f. of two Order Statistic – Joint p.d.f. of all n order Statistic – Distribution of Range and Other Systematic Statistics. Application of Chi-square Tests: Inferences about a Population Variance, Goodness of Fit, Test of Independence of Attributes- Contingency Tables – Yate's Correction – Chi-square Test of Homogeneity of Correlation Coefficients.
Chapter 9: Section 9.15; Chapter 15: Section 15.6 (15.6.1 – 15.6.4, 15.6.6)

Unit II	(13 Hours)

Theory of Estimation: Parameter Space, Statistics, Estimators and Estimate – Characteristics of Estimators – Unbiasedness – Consistency – Invariance Property of Consistent Estimators – Sufficient Conditions for Consistency – Efficient Estimators – Most Efficient Estimator – Minimum Variance Unbiased Estimators – Simple Problems.
Chapter 17: Sections: 17.1, 17.2 (17.2.2, 17.2.3)

Unit III	(13 Hours)

Sufficiency – Neymann Factorization Theorem – Cramer-Rao Inequality – Conditions for the equality sign in Cramer-Rao Inequality – Complete Family of Distributions – MVU and Blackwellisation – Rao-Blackwell Theorem – Simple Problems.
Chapter 17: Sections: 17.2.4, 17.3, 17.4, 17.5

Unit IV	(13 Hours)

Methods of Estimation: Method of Maximum Likelihood Estimation – Properties of Maximum Likelihood Estimators – Method of Minimum Variance – Method of Moments – Method of Minimum Chi-square Estimation – Simple Problems.
Chapter 17: Sections: 17.6

Unit V	(13 Hours)

Interval estimation: Confidence Interval and Confidence Limits – Derivation of Confidence Interval based on Normal, t, Chi-square and F Distributions – Confidence Interval for Large Samples – Simple Problems.
Chapter 17: Section: 17.7

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Fundamentals of Mathematical Statistics	S.C Gupta and V.K. Kapoor	Sultan Chand & Sons, New Delhi, 2016 Reprint.

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Introduction of Mathematical Statistics	Robert V. Hogg and Allen T. Craig	Pearson Education, 2004
2	Statistical Inference	George Casella and Roger L. Berger	Cengage Learning, 2016

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course Part III – Core VIII Sampling Theory	**Course Code: 517W08**
Semester: V	**No. of Credits: 4**
No. of hours : 75	**C:T: 65:10**
CIA Max. Marks: 25	**ESE Max. Marks 75**

(C: Contact hours, T: Tutorial)

Course Objectives:

- to create awareness on census surveys
- to introduce various sampling methods and the different types of populations to which the sampling methods are applicable.
- to provide skills to determine the efficiency of the estimators in various sampling methods.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Estimate the sample size for a research or a study.	U
CO2	Demonstrate the optimum results with the available sources at the disposal by studying the sample values.	U
ÇO3	Develop an understanding about different sampling methods based on probability and non-probability sampling	A
CO4	Obtain best possible estimates of the population parameters.	U
CO5	Increase the level of efficiency and cost reduction of sampling.	A
CO6	Evaluate mean and variance of the parameter based on different sampling methods.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I	(13 Hours)

Introduction – Parameter and Statistic – The Principal steps in a Sample Survey – Principles of sample survey – Sampling and Non-sampling errors – Merits of sampling Technique – Limitations of sampling.
Book 1: Chapter 7 (Sections 7.1 – 7.7)

Unit II	(13 Hours)

Types of Sampling – Simple Random Sampling: Selection of simple random sample – Notations and Terminology of SRS – Theorems related to Simple random sampling without and with replacement – Estimation of population mean and Variance – Merits and Demerits of Simple Random Sampling.
Book 1: Chapter 7: Sections: 7.8, 7.9(7.9.2, 7.9.4, 7.9.5)

Unit III	(13 Hours)

Stratified Random Sampling: Introduction – Advantages of Stratified Random Sampling – Notations and Terminology – Theorems related to Estimate of population mean and variance – Allocation of Sample Size – Comparison a Stratified Random Sampling with Simple Random Sampling without Stratification.
Book 1: Chapter 7: Sections: 7.10 (7.10.1 – 7.10.4)

Unit IV	(13 Hours)

Systematic Sampling – Notations and terminology – Variance of the estimated mean – Systematic Sampling versus Stratified Random Sampling – Merits and Demerits of systematic Sampling- Circular Systematic Sampling.
Book 1: Chapter 7: Sections: 7.11 (7.11.1 – 7.11.3, 7.11.5, 7.11.6)

Unit V	(13 Hours)

Single-Stage cluster sampling (clusters of equal sizes) – Reasons for Cluster Sampling – Variance in terms of Intracluster Correlation – Ratio estimators: Methods of Estimation – The Ratio Estimator – Estimation of variance from a sample – Comparison of the Ratio Estimate with the Mean per Unit – Bias of the ratio estimate.
Book 2: Chapter 9 (Sections 9.1, 9.4); Chapter 6 (Sections 6.1, 6.2, 6.4, 6.6, 6.8)

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – IV	Fundamentals of Applied Statistics	V.K. Kapoor and S.C. Gupta	2017 Reprint, Sultan Chand & Sons, New Delhi.
V	Sampling Techniques	Cochran	2015, John Wiley & sons

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core IX Design of experiments	Course Code: 517W09
Semester: V	No. of Credits: 4
No. of hours : 75Hours	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:
- to provide basic principles of experimentation
- to initiate discussions on the analysis of data relating to agriculture, biological sciences and industry.
- to impart the concept of analysis of variance
- to implement comparisons based on F distribution for various designs employed
- to imbibe estimation skills with missing observations and compare the efficiencies of various designs.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Demonstrate the variation of information under conditions that are hypothesized to reflect the variation	U
CO2	Explain the partitioning of the total sum of squares into the 'within' and 'between' group components	R
ÇO3	Predict the outcome by introducing a change of pre-conditions, represented by one or more independent variables.	A
CO4	Study the effect of each factor on the response variable and the effects of interactions between factors on response variable	R
CO5	Increase statistical power by reducing the within-group error variance	A
CO6	Improve the robustness of the design or process.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(15 Hours)
Linear Model – Fixed, Mixed and Random Effect Models with examples – Analysis of Variance – Assumptions – ANOVA for One-Way and Two-Way Classifications for Fixed Effect Case – Estimators – Variance of the Estimators – Splitting Sum of Squares – Critical Difference. Book 1: Chapter 5 Sections 5.1, 5.2(5.2.1,5.2.2), 5.3(5.3.1,5.3.2)	

Unit II	(11Hours)
Experimentation – Terminology – Experimental Error – Principles of design – Uniformity trial – Completely Randomized Design(CRD) – Analysis of CRD – Merits and Demerits – Randomized Block Design(RBD) – Analysis of RBD – Merits and Demerits – Latin Square Design(LSD) – Analysis of LSD – Merits and Demerits. Book 1: Chapter 6 Sections 6.1 – 6.4, 6.5(6.5.1 – 6.5.5), 6.6(6.6.1 – 6.6.5)	

Unit III	(13 Hours)
Efficiency of RBD over CRD – Efficiency of LSD over RBD and CRD – Missing plot techniques in RBD and LSD with one and two missing observations. Book 1: Chapter 6 Sections 6.5(6.5.6, 6.5.7),6.6(6.6.6 – 6.6.8), 6.8	

Unit IV	(13 Hours)
Factorial Experiments – Advantages of Factorial Experiment over simple Experiment – Symmetrical and Asymmetrical Factorial Experiments – Analysis of 2^2, 2^3 and 3^2 Factorial Experiments. Book 1: Chapter 6 Section 6.9 Book 2: Chapter 2 Sections 2.12	

Unit V	(13 Hours)
Analysis of Covariance – ANOCOVA in CRD and RBD with one concomitant variable – Split Plot Design and its Analysis (outline only) Book 1: Chapter 6 Sections 6.7, 6.12	

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I-III	Fundamentals of Applied Statistics	Gupta S.C and Kapoor V.K,	Sultan Chand & sons, 2017 Reprint
IV- V	Fundamentals of Statistics (Vol. II)	A. M. Gun, M.K.Gupta & B Dasgupta	World Press, 9th Edition, 2018 Reprint

Books for Reference:

S. No.	Name of the Book	Authors	Publishers with Edition
1	Design and Analysis of Experiments	Das, M.N. and Giri, N.L, Wiley Eastern	
2	Design and Analysis of Experiment,	Kempthorne,	Wiley Eastern Pvt. Ltd., Reprint 1967

Course Designed by :	**Mrs. K. Kaviyamani**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core X Statistical Quality Control - I	**Course Code: 517W10**
Semester: V	**No. of Credits: 4**
No. of hours : 75 (Total hours)	**C:T: 65:10**
CIA Max. Marks: 25	**ESE Max. Marks: 75**

(C: Contact hours, T: Tutorial)

Course Objectives:
- to introduce the concept of quality control and its need in real life.
- to impart knowledge of various tools used such as control charts and different sampling plans in quality aspects.
- Enable the students to skillfully handle the tools
-

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Describe the purpose and function of Quality control.	**R**
CO2	Demonstrate to control material reception, internal rejections, clients, claims and evaluation of the same corrective actions related to their follow-up.	**U**
ÇO3	Examine the difference between attributes and variables.	**U**
CO4	Measure and control the quality by monitoring the manufacturing process using various charts in quality system.	**U**

| **CO5** | Develop and use the quality indicators to customer requirements and satisfaction and to the management. | **A** |
| **CO6** | Take decisions to accept or reject a lot using various sampling plans. | **A** |

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	**(13 Hours)**

Quality Control – Quality characteristics – Cost of Quality – Optimum Cost of Performance – Value of Quality – Balance between the Cost and Value of Quality – Specification of Quality – Quality control and Inspection –Quality Policy – Statistical Quality Control – Benefits of SQC – Quality perspective.
Book 1: Chapter 1 (Sections 1.9 – 1.20)

Unit II	**(13Hours)**

Control Chart for Variables –Definition – Objectives – Control Limits – $\bar{X}$, R and σ Charts – Simple Problems.
Book 2: Chapter 1 (Section 1.8)

Unit III	**(13 Hours)**

Control Chart for Attributes – np, p, c and u Charts –Comparison between Variable and Attribute Charts – Simple Problems.
Book 2: Chapter 1 (Section 1.9)

Unit IV	**(13 Hours)**

Acceptance Sampling Inspection Plans – Acceptance Sampling for Attributes – Producer's Risk and Consumer's Risk – OC, AOQ, ASN, AOQL and ATI curves – Single Sampling Plan – Derivation of OC, ASN and ATI – Double Sampling Plan – Derivation of OC, ASN and ATI – Single Sampling against Double Sampling Plans.
Book 2: Chapter 1 Sections 1.11, 1.12(1.12.1 – 1.12.3)

Unit V	**(13 Hours)**

Sequential Sampling Plan – Sequential Probability Ratio Test (SPRT) – Derivation of OC function of SPRT – Derivation of Five Points on OC Curve – Derivation of Five Points on ASN Curve.
Book 2: Chapter 1 Section 1.12.4

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I	Statistical Quality Control	M. Mahajan	Dhanpat Rai & Sons, 2018 Reprint.
II – V	Fundamentals of Applied Statistics	S.C. Gupta and V. K. Kapoor	Sultan Chand & Sons, 2016 Reprint

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Statistical Quality Control,	E.L. Grant and R.S. Leavenworth	McGraw Hill (India) Pvt. Ltd., 2014, 22nd Reprint
2	Introduction to Statistical Quality Control,	Douglas C. Montgomery	2008 Reprint, Wiley & Sons.

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. S. Geetha**	**Dr. S. Geetha**
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Elective I Numerical Methods	**Course Code: 517WE1**
Semester: V	**No. of Credits: 4**
No. of hours : 75 (Total hours)	**C:T: 65:10**
CIA Max. Marks: 25	**ESE Max. Marks: 50**

(C: Contact hours, T: Tutorial)

Course Objectives:
- to introduce interpolation concepts
- to effectively apply the appropriate formula for the data
- to provide knowledge about numerical integration as an alternative to direct integration.
- to develop problem solving skills.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Apply forward and backward interpolation in the correct context.	**A**
CO2	Demonstrate the application of central difference formula	**U**
ÇO3	Recognize the situations where interpolation with unequal intervals can be applied and apply the same.	**R**
CO4	Derive various numerical formulae	**A**
CO5	Compute derivatives of functions using interpolation methods	**U**

CO6	Compute integrals of functions using interpolation methods	U

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	**(13 Hours)**

Finite differences: First difference-Express any value of y in term of y_n and the backward differences of y_n– Differences of a polynomial – Factorial polynomial. Interpolation (for Equal Intervals): Introduction – Gregory-Newton forward Interpolation formula – Gregory-Newton backward Interpolation Formula – Equidistant terms with one or more missing values.
Chapter 5 (Sections 5.1 – 5.4); Chapter 6 (Sections 6.1 – 6.3, 6.7)

Unit II	**(13 Hours)**

Central Difference Interpolation formulae (For Equal Intervals): Central differences and central difference table – Central difference interpolation formula – Gauss's forward interpolation formula – Gauss's backward interpolation formula – Stirling's formula – Bessel's formula.
Chapter 7 (Sections 7.1 – 7.6)

Unit III	**(13 Hours)**

Interpolation With Unequal Intervals: Introduction – Divided differences – Properties of divided differences – Relation between divided differences and forward differences – Theorem: Newton's interpolation formula for unequal intervals – Deduction: Deduce Gregory Newton interpolation forward formula for equal intervals – Lagrange's interpolation formula (for unequal intervals) – Different form of Lagrange's interpolation formula – Inverse Interpolation.
Chapter 8 (Sections 8.1 – 8.8)

Unit IV	**(13 Hours)**

Numerical differentiation and Integration: Introduction – Newton's forward difference formula to get the derivative – Newton's backward difference formula to compute the derivative – Derivative using Stirling's formula – To find maxima and minima of the function given the tabular values.
Chapter 9 (Sections 9.1 – 9.6)

Unit V	**(13 Hours)**

Numerical Integration: Introduction – Trapezoidal rule – Simpson's one-third rule – Simpson's three-eighths rule. Numerical Solution of Ordinary Differential Equations: Introduction – Solution by Taylor Series (Type I) – Euler's Series – Runge-Kutta Method.
Chapter 9 (Sections 9.7, 9.9, 9.13 & 9.14) Chapter 11(Sections 11.5, 11.9, 11.12)

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I - V	Numerical Methods,	Dr.P.Kandasamy, Dr.K.Thilagavathy and Dr.K.Gunavathi,	S.Chand & Company limited, Reprint 2012,

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Numerical Methods in Science and Engineering,	Dr. M.K.Venkataraman	National Publishing company, 5th edition, 1995
2	Finite differences and Numerical Analysis	H.C.Saxena,	S.Chand & Company Ltd., New Delhi, 2001

Course Designed by :	**Mrs. T. Vanjikkodi**	
Course Reviewed by :	**Mrs. A. Samsath**	
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Elective I Biostatistics	**Course Code: 517WE2**
Semester: V	**No. of Credits: 4**
No. of hours : 75 (Total hours)	**P:T: 65:10**
CIA Max. Marks: 25	**ESE Max. Marks: 75**

(P: Practical hours, T: Tutorial)

Course Objectives:
- to provide appropriate statistical methods for the biological study.
- to identify and communicate findings from the biomedical research.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Compare the means of two or more than two samples simultaneously.	U
CO2	Evaluate the multiple regression coefficients and the suitability of the regression model.	A
ÇO3	Determining the association of variables used in the research.	U
CO4	Calculate and interpret the data using a wide variety of distribution free tests.	U

| CO5 | Develop and use survival curves to make conclusions of research work. | A |
| CO6 | Interpreting the biological studies using various statistical tools. | U |

R-Remembrance U –Understanding A-Apply

Syllabus:

List of Programs

1. Application of t test in homozygous sickle-cell disease.
2. Application of paired t test for examining gallbladder function before and after fundoplication.
3. Application of Randomized Block Design in the comparison of methods for teaching patients to use a certain prosthetic device by a Physiotherapist.
4. Application of Two-way Analysis of Variance in examining the subjects with chronic, nonspecific low back pain.
5. Application of Correlation to analyze somatosenory evoked potentials and their Interactions.
6. Application of Multiple Regression in predicting the capacity to direct attention in elderly subjects using children age and education level.
7. Examine the association of short-term clinical, economic and humanistic outcomes of pharmaceutical care services for patients with diabetes using Chi-square Test.
8. Application of Sign test to test the mentally retarded girls while giving instruction in personal care and grooming for two weeks.
9. Investigating the measurement of cardiac output of post cardiac surgical patients in the left lateral position by using Wilcoxon Signed Rank Test.
10. Investigating the level of mental health of urban and rural male junior high school students by using the Median Test.
11. Experimenting the effects of prolonged inhalation of cadmium oxide which reduces hemoglobin level by using Mann-Whitney U Test.
12. Examining the fasting blood glucose determinations by using Kolmogorov-Smirnov Test.
13. Examining the relationship between age and mineral concentration using Spearman Rank Correlation.
14. Assessing results and identifying predictors of survival by reviewing the primary malignant tumors of the sternum by using the Kaplan-Mier Procedure.
15. To determine whether time to relapse among drug users is related to patient age and drug of choice using Hazard Regression Model.

Book for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1.	Biostatistics – Basic concepts and Methodology for the Health Sciences	Wayne W Daniel & Cad L. Cross	Wiley International, 2015 Reprint.

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core XI Statistical Inference - II	Course Code: 617W11
Semester: VI	No. of Credits: 4
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:
- to impart knowledge on the methods of testing the hypothesis on different distributions.
- to educate the students to identify the areas of application of Neyman-Pearson Lemma.
- to provide a complete knowledge about testing procedures of means and variances
- to teach the fundamentals of sequential analysis.
- to enable the students to distinguish parametric and non-parametric methods.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Demonstrate the plausibility of pre-specified ideas about the parameters of the model by examining the area of hypothesis testing.	U
CO2	Identify the components of a classical hypothesis test including two types of errors, null and alternative hypothesis.	R
ÇO3	Demonstrate the theory of likelihood ratio test to test the significance of samples	U
CO4	Critically examine sequential procedures for appropriate statistical analysis.	U
CO5	Demonstrate the use of non-parametric statistical methods and to interpret and analyze the results.	U
CO6	Use the learnt statistical methods to analyze certain real life data	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	**(13 Hours)**

Testing of statistical Hypothesis – Simple and composite hypothesis null and alternative hypothesis –Critical Region – Types of errors – level of significance – size of the test – power of the test – Steps involved in testing of hypothesis.
Chapter 18 Sections 18.1 – 18.3

Unit II	**(13 Hours)**

Randomized and Non Randomized Test – Most Powerful Test – Neyman-Pearson Lemma and its applications – Unbiased test and unbiased critical Region – Optimum regions and sufficient statistics – Uniformly Most Powerful Critical Region – simple problems.
Chapter 18 Sections 18.4, 18.5

Unit III	**(13 Hours)**

Test of Significance – Test of significance for Single Proportion, difference of Proportions – Test of Significance for Single Mean, difference of Means – Test of Significance for the difference of Standard Deviation – Bartlett's Test.
Chapter 14 Sections 14.7, 14.8

Unit IV	**(13 Hours)**

Likelihood ratio test – Test Procedure – Properties – Simple Problems – Sequential Analysis: Introduction – Sequential Probability Ratio Test (SPRT)-Operating Characteristic Function of SPRT – Average Sample Number – Simple Problems.
Chapter 18 Sections 18.6(16.6.1), 18.8

Unit V	**(13 Hours)**

Non-parametric Methods – Comparison between Parametric and Non-Parametric Methods – Run Test, Test for Randomness, Median Test, Sign Test, Mann-Whitney U Test – Kolmogorov-Smirnov Tests – Simple Problems.
Chapter 18 Section 18.7

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Fundamentals of Mathematical Statistics	S.C Gupta and V.K. Kapoor	Sultan Chand & Sons, New Delhi, 2016 Reprint.

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Introduction to Mathematical Statistics	Robert V. Hogg and Allen T. Craig	Pearson Education, 5th Edition, 2004
2	Statistical Inference,	George Casella, Roger C. Berger	Cengage Learning India Pvt. Ltd., 2016 Reprint. .

Course Designed by :	**Mrs. K. Kaviyamani**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc. Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course Part III – Core XII Statistical Quality Control -II	**Course Code: 617W12**
Semester: VI	**No. of Credits: 4**
No. of hours : 75 (Total hours)	**C:T: 65:10**
CIA Max. Marks: 25	**ESE Max. Marks: 75**

(C: Contact hours, T: Tutorial)

Course Objectives:
- to expose the concepts of total quality management used in industries, quality system standards and reliability concepts to control the quality of industrial outputs.
- to create awareness about the ISO quality standards of institutions
- to equip the students with various tools of TQM.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Apply and evaluate best practices for the attainment of total quality.	**A**
CO2	Develop various operating cost components and applications of JIT for operations management.	**A**
ÇO3	Elucidate the functioning and application of six-sigma in process control	**U**
CO4	Explain how ISO 9000 series is used in attaining quality standards	**U**

| CO5 | Demonstrate the fundamental concepts and methodologies used in reliability analysis. | U |
| CO6 | Follow ethics while implementing the tools of TQM | R |

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(13 Hours)

Total Quality Management (TQM) – Need for management of product quality – concept of TQM – TQM philosophies – TQM models – Dimensions of TQM – Elements of TQM.
Book 1: Chapter 2(Sections 2.1 – 2.4, 2.12)

Unit II	(13 Hours)

Waste Control Management – Just-in-time Manufacturing (JIT) – Characteristics, Goals – Elements of JIT – Kanban System – Functions, Rules – Benefits of JIT – Limitations of JIT – Total Quality Management for Excellence.
Book 1: Chapter Sections 2.23, 2.25, 2.26

Unit III	(13 Hours)

Statistical Process Control (SPC) – Evolution of six sigma quality approach – the mathematics of six sigma – Practical approach to six sigma quality – TQM and six sigma – Six sigma concept of process capability – Six sigma and Indian industries.
Book 1: Chapter 3(Section 3.18)
Book 1: Chapter 17

Unit IV	(13 Hours)

Quality system standards – ISO Standards – Features of ISO: 9000 series standards – Various elements in ISO: 9001 model – ISO implementation – ISO 9001: 2008 – Transition to ISO 9001:2015 – Introduction – Revision process – user groups – Implementation guidelines.
Book 2: Chapter 5(Sections 5.6, 5.8)
Http:// ISO 9001:2015 implementation guidance

Unit V	(13 Hours)

Reliability – Quality Control and Reliability – Basic Elements of Reliability – Achievement of Reliability – Designing, Measurement, Cost, Maintenance and Availability – Failure Mode Effect and Criticality Analysis (FMECA) – Failure Rate and Hazard Function – Constant Hazard Mode – Linear Hazard Model – Mean time to failure.
Book 1: Chapter 13(Sections 13.1 – 13.6)

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – III & V	Statistical Quality Control	M. Mahajan	Dhanpat Rai & Sons, 2018 Reprint
IV	Total quality Management	Dr. K. Maran and Dr. K. Raja	Eswar Press, Chennai, 2009 Reprint

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Statistical Quality Control,	E.L. Grant and R.S. Leavenworth,	McGraw Hill (India) Pvt. Ltd., 2014 Reprint

B.Sc Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Elective II Matrices	Course Code: 617WE4
Semester: VI	No. of Credits: 4
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 50

(C: Contact hours, T: Tutorial)

Course Objectives:
- to identify a system of linear equations and describe its solution set.
- to exploit elementary operations to reduce matrices to echelon forms.
- to be aware of the various characterizations of an invertible matrix.
- to apply the properties of determinants in their calculation
-

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Perform common matrix operations such as addition, multiplication and transposition.	U

CO2	Solve a system of linear equations and find out the feasible solution.	A
CO3	Establish a sufficient condition for invertibility in terms of elementary matrices.	A
CO4	Apply elementary transformations to reduce the matrix to Echelon and normal form and determine its rank.	A
CO5	Finding powers of a matrix and determining matrix inverse using Cayley-Hamilton Theorem.	U
CO6	Interpret existence and uniqueness of solutions geometrically.	U

R-Remembrance U –Understanding A-Apply

Syllabus:

| **Unit I** | **(13 Hours)** |

Definition of a Matrix – Notations – Difference between a Matrix and a Determinant – Kinds of Matrices – Equality of Matrices – Addition of Matrices – Subtraction of Matrices – Properties of Matrix Addition – Multiplication of Two Matrices – Properties of Matrix Multiplication – Matrix Polynomial – Transpose of a Matrix –Symmetric and Skew-Symmetric Matrices – Conjugate of a Matrix – Hermitian Matrix – Skew-Hermitian Matrix – Simple Problems.
Chapter 1: Page No.: 3 – 62; Chapter 2: Page No.: 67 – 105

| **Unit II** | **(13 Hours)** |

Determinants – Minor Determinants – Cofactor of an Element – Properties of the Determinants – Notations – Product of two Determinants – Product of Two determinants of different Orders – Adjoint Determinant – Complementary Minor of a Determinant – Laplace Expansion of a determinant by the minors of first r columns – Cramer's Rule – Symmetric and Skew-Symmetric Determinant – Simple Problems.
Chapter 3: Page No.: 137 – 228

| **Unit III** | **(13 Hours)** |

Adjoint of a Matrix – Inverse of a Matrix – Inversion of a Matrix by solving Algebraic Equations – Elementary Operations and Elementary Matrices – Symbols to be used for Elementary Transformations – Inverse of the Elementary Transformation – Symbols for Elementary Matrices – Equivalent Matrices – Reduction of a Matrix to Triangular Form – Partitioning of Matrices – Identically Partitioned Matrices – Matrices Partitioned Conformably for Multiplication.
Chapter 4: Page No.: 229 – 336

Unit IV	(13 Hours)

Rank of a Matrix – Sub-Matrix – Minor of a Matrix – Rank of a Matrix – Nullity of a Matrix – Invariance of Rank through Elementary Transformations – Normal Form – Procedure for Reduction to Normal Form – Rank of a Matrix Product – Simple Problems.
Chapter 5: Page No.: 337 – 389

Unit V	(13 Hours)

Characteristic Roots and Vectors: Matrix Polynomial – Equality of Two Matrix Polynomials – Mapping or Function or Transformation – Linear Transformation – Characteristic Roots and Vectors – Characteristic Value Problem – Some Definitions – Cayley-Hamilton Theorem – Simple Problems.
Chapter 8: Page No.: 450 – 506

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	A Textbook of Matrices,	Hari Kishan,	Atlantic Publishers, NewDelhi, 2008.

Book for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Matrices	A.R.Vasishtha and A.K.Vasishtha	Krishna Prakashan Media(P) Ltd., 18th Edition, 2008.

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Mrs. T. Vanjikkodi	
Head of the Department :		

B.Sc. Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III– Elective III – Psychological Statistics	Course Code: 617WE5
Semester: VI	No. of Credits: 3
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 50

(C: Contact hours, T: Tutorial)

Course Objectives:
- to gain knowledge in the application of scaling procedure and different types of rank correlation.
- to demonstrate the kinds of evidence that would be relevant to assessing the reliability and validity of a particular measure.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Measure the degree of similarity between the variables by using different ranking techniques.	U
CO2	Determine an ordinal relationship between rankings of different ordinal variable or different rankings of same variable.	U
ÇO3	Identify the consistency of a measure using reliability techniques.	R
CO4	Examines the issues involved in developing and validating multi-item self report scales of latent constructs.	U
CO5	Predict the relationship between the variables in psychological research.	A
CO6	Classify the research methods used in psychology and apply the statistical techniques used in psychological research.	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(13 Hours)
Introduction – Some Scaling Procedures – Scaling Individual Test Items in Terms of Difficulty – Scaling of scores on a test – z or σ Scores, Standard Scores, Normalized Scores, T-Score, Percentile Scores – Scaling of Ranking in terms of Normal probability curve – scaling of ratings in terms of Normal probability curve. Book 1: Chapter 8(Sections 8.1, 8.2)	

Unit II	(13 Hours)
Reliability of Test Scores – Definition of Reliability – Index of Reliability – Methods of Determining Test Reliability – The Test-Retest Methods – Alternate or Parallel form Method – Split-half method – The Rulon Method – Method of Rational Equivalence. Book 1: Chapter 8(Sections 8.3 – 8.3.4)	

Unit III	(13 Hours)
Validity of Test Scores – Estimation of Validity – Types of Validity – Validity and Test Length – Comparison between reliability and validity – Intelligence tests and Intelligence Quotient. Book 1: Chapter 8(Sections 8.4, 8.5)	

Unit IV	(13 Hours)

Correlation Ratio – Intra-Class Correlation – Multiple and Partial Correlation – Coefficient of Partial Correlation – Coefficient of Multiple Correlation – Simple Problem.
Book 3: Chapter 12 (Sections 12.1, 12.2, 12.4, 12.7, 12.8)

Unit V	(13 Hours)

Correlation from Ranks –Biserial Correlation –Correlation from four-fold table – The Contingency Coefficient – Curvilinear or Non-linear Relationship.
Book 2: Chapter 14

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I-III	Fundamental of Applied Statistics	S.C. Gupta and V.K. Kapoor	Sultan Chand & Sons, 2017 Reprint
V	Statistics in psychology and Education	Henry E Garrett	2014 Reprint, Paragon International publisher
IV	Fundamentals of Mathematical Statistics	S.C. Gupta and V.K. Kapoor	2016 Reprint, Sultan Chand & Sons

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

Syllabus having direct bearing on Entrepreneurship Development
B.Sc. Statistics
Semester III
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Skill Enhancement Course I Actuarial Statistics I	Course Code: 317WS1
Semester: III	No. of Credits: 3
No. of hours : 45 (Total hours)	C:T: 39:6
CIA Max. Marks: 75	ESE Max. Marks: -

(C: Contact hours, T: Tutorial)

Course Objectives:
- To expose the major life insurance policies covered in Indian life insurance
- Infuse skill in decision making regarding risk
- Demonstrate the use of mortality tables.
- Enable a good choice of investments
- Make appropriate decision regarding policies.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Describe the theoretical and practical aspects of actuarial science.	R
CO2	Explain the legality and administrative issues of life policies	R
ÇO3	Demonstrate the skills for interpreting and analyzing actuarial and statistical information.	A
CO4	Compare various kinds of life insurance policies and their benefits.	U
CO5	Demonstrate mortality concepts in life insurance.	A
CO6	Estimating the policy value of life insurance using annuities	U

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(8 Hours)
Principles of Life Assurance: Nature of Insurance – Classification of Insurance – History of Life Insurance in India. Chapter 1: (Pages 3 – 7), Chapter 2: (Pages 8 – 11)	

Unit II	(8 Hours)
Definition of whole life assurance – term assurance – pure endowment – endowment assurance – critical illness assurance – whole life level annuity – temporary level annuity premium, benefit – assurance and annuity contracts. Chapter 6: (Pages 43 – 50), Chapter 7:(Pages 82 – 84)	

Unit III	(8 Hours)
Selection of Risk – Purpose of selections – Factors affecting risks – Sources of risk information – Insurance of ladies and minors – Non-medical business – Classes of risk – Methods of risk classification – Measurement of Risk – Treatment of sub-standard risks – Methods of treating sub-standard risks – Mortality table – Features – Construction of death rate on yearly basis – Sources of mortality information – Construction of mortality table – Types of mortality tables – Interest factor. Chapter 8: (Pages 85 – 100), Chapter 9: (Pages 103 – 113), Chapter 11: (Pages 128 – 131)	

Unit IV	(8 Hours)

The Reserve: Nature, definition, origin, sources, need - Methods of calculating Reserve – Investment of funds: Need, Sources – Problems of investment – The principles of investment – Suitability of various types of investments –Surrender value – Basis of calculating surrender value – Forms of payment – Valuation and Surplus – The calculation process – Sources of surplus – Difference between surplus and profit – Bases of allotment of profit – Distribution of surplus – Bonus – Classification – Options.
Chapter 12: (Pages 132 – 138), Chapter 13: (Pages 140 – 146),
Chapter 14: (Pages 156 – 159), Chapter 15: (Pages 160 – 165)

Unit V	(8 Hours)

Policy condition – Life insurance for under privileged – Industrial life insurance – Group life insurance – Disability Benefit policies – Social security schemes – Pension Plans – Micro life insurance.
Chapter 16: (Pages 166 – 171), Chapter 17: (Pages 178 – 191)

Book for study:

Unit	Name of the Book	Authors	Publisherswith Edition
I – V	Insurance Principles and practice	M.N. Mishra and S.B. Mishra	S. Chand and Sons, 21st Edition, 2014.

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core Practical III Statistical Practical-III (Using SPSS)	Course Code: 617WP3
Semester: VI	No. of Credits: 2
No. of hours : 60 Hours	P:T: 52:8
CIA Max. Marks: 25	ESE Max. Marks: 50

(T: Tutorial, P: Practical)
Course Objectives:
 The objectives of this course are
  ⬚ to impart the fundamental features of SPSS

☐ to secure knowledge in analyzing the data using SPSS software package.

☐ to train the students to apply the appropriate statistical tools for data analysis.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Interpret results using various types of charts.	**U**
CO2	Carryout inferential statistical analysis using SPSS.	**A**
ÇO3	Test the significant relationship between the variables and interpret the result	**A**
CO4	Independently use the various tools to analyze real time data.	**A**

R-Remembrance U –Understanding A-Apply

Syllabus:

List of Programs	(52 Hours)
1. Bar Chart, Line Chart, Pie Chart. 2. Scatter Plots and Histograms. 3. Construction of Frequency Distribution. 4. Measures of Central tendency. 5. Measures of Dispersion. 6. Correlation. 7. Linear Regression. 8. t-test with one sample. 9. Paired t test. 10. Independent sample t test. 11. ANOVA – One-way. 12. ANOVA – Two- way. 13. Non-Parametric Analysis: Chi-square test for goodness of fit, 14. Spearman's Rank correlation 15. Mann-Whitney U test. 16. Wilcoxon signed rank test 17. Kruskal-Wallis Test. 18. Sign Test. 19. Median Test. 20. Kolmogorov-Smirnov Test. 21. Control Charts for Attributes. 22. Control Charts for Variables.	

Books for Reference:

S. No.	Name of the Book	Authors	Publishers with Edition
1	SPSS 17.0 for	Dr. S. L Gupta and Hitesh	International Book House

	Researchers	Gupta	Pvt. Ltd., 2011 Reprint
2	Using SPSS-Interactive Hands on Approach	James B. Cunningham, James O.Aldrich	Sage Publications India Pvt. Ltd., 2012 Reprint
3	SPSS for you	A. Rajathi and P. Chandran	MJP Publisher, 2010 Reprint.

Course Designed by :	**Mrs. K. Kaviyamani**	
Course Reviewed by :	**Dr. S. Geetha**	**Dr. S. Geetha**
Head of the Department :		

B.Sc. Statistics
Semester IV
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Skill Enhancement Course II **Actuarial Statistics - II**	**Course Code: 417WS2**
Semester: IV	**No. of Credits: 3**
No. of hours : 45 (Total hours)	**C:T: 39:6**
CIA Max. Marks: 75	**ESE Max. Marks: -**

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are
- to comprehend and explain various concepts relating to marine insurance, policy conditions and payments of marine insurance.
- to possess a sound knowledge about various marine insurance business in India and to utilize the same in their profession

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Determine the various policies unique to the marine insurance industry	**U**
CO2	Explore the different sectors within marine insurance: cargo insurance, Hull and Machinery insurance and others	**U**
ÇO3	Provide complete details of the claims process	**R**
CO4	Identify the different roles played within the marine insurance industry	**R**
CO5	Classify the insurance needs of the owners and charterers as well as being able to identify relevant covers and the markets available for placing the covers.	**U**
CO6	Identify and describe legal and policy issues in commercial contexts.	**R**

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(8 Hours)
Marine insurance – Definition – Subject matter – Hull insurance – Cargo insurance – Freight insurance – Liability insurance – Documents of marine insurance – Procedure to effect marine insurance – Elements of marine insurance – History – Marine publications – Marine insurance policies – Classes of policies. Chapter 19 (Pages 267 – 286), Chapter 20 (Pages 287 – 291)	

Unit II	(8 Hours)
Policy conditions – Lloyd's form of policy – Description of the clauses – Risk covered by ICC (A) – Premium calculation – Rate making in marine insurance – Return of premium. Chapter 21(Pages 292 – 298), Chapter 22 (Pages 299 – 302)	

Unit III	(8 Hours)
Marine losses – Marine perils – Total loss – Partial loss – Particular average loss – Illustration – General average – Types of general average loss – General average contribution – Application of general average to insurance – Expenses. Chapter 23(Pages 303 – 314)	

Unit IV	(7 Hours)
Payment of claims – Documents Required for claim – Documents in different types of claims – Extent of liability – Some practical problems. Chapter 24 (Pages 315 – 321)	

Unit V	(8 Hours)
Marine insurance business in India – Business of Indian Insurers progress before Nationalization – Indian Insurers – Gross direct premium income – Net premium income – Underwriting experiences in Marine insurance – Some articles in marine insurance. Chapter 25 (Pages 322 – 350)	

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Insurance Principle and practice	M.N.Mishra and S.B. Mishra	S.Chand & Co

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc. Statistics

Semester VI

(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Elective II Operations Research	Course Code: 617WE3
Semester: VI	No. of Credits: 4
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 50

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are

- to introduce the fundamentals of optimization techniques .
- to formulate a real life problem into a linear programming model.
- to solve and interpret the solutions of the LPP model
- to efficiently allocate resources
- to create an awareness of the application of optimization in inventory control
- to expose the networking techniques to the students

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Formulate and solve linear programming problems using appropriate techniques and interpret the results obtained.	A
CO2	Build and solve transportation models and assignment models.	A
ÇO3	Propose good strategies in two person zero sum games.	R
CO4	Optimize the outputs in terms of time, cost or profit	U
CO5	Predict the profit and cost expenses in a simple inventory system	A
CO6	Compute the necessary parameters in a network	U

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(13 Hours)
Linear Programming: Introduction – Linear Programming Problem. Graphical Solution and Extension: Introduction - Graphical solution method – some exceptional cases-General Linear Programming Problem – Canonical and Standard forms of LPP – Simplex method: Introduction – computational Procedure – Use of Artificial Variables (Big M method only). Chapter 2(Section 2.1,2.2) Chapter, 3(3.1-3.5),Chapter 4(Sections 4.1 ,4.3, 4.4)	

Unit II	(13 Hours)

Transportation Problem : Introduction – LP formulation of the transportation Problem – The transportation table – Loops in transportation tables – Finding an initial basis feasible solution: North west corner method – least-cost method – Vogel's Approximation method – Test for Optimality – Transportation Algorithm (MODI METHOD). Assignment Problem: Introduction – Mathematical formulation of the problem –Solution Method of Assignment problems.
Chapter 10 (Sections 10.1,10.2, 10.5 , 10.6, 10.9,10.10,10.12,10.13),
Chapter 11 (Sections 11.1 – 11.3)

Unit III	(13 Hours)

Sequencing problem: Introduction – Problem of sequencing – Basic terms used   in sequencing – Processing n Jobs through two machines - Processing n Jobs   through k machines - Processing 2 Jobs through k machines. Games and Strategies: Introduction – Two- Person Zero-sum game – some basic terms – The Maximin-Minimax Principle – Games without Saddle point – mixed strategies -Graphical Solution of 2xn and mx2 games.
Chapter 12 (Sections 12.1 – 12.6); Chapter 17 (Sections 17.1 – 17.6)

Unit IV	(13 Hours)

Inventory Control I: Introduction – Types of inventories – Reasons for carrying inventories – The inventory decisions – Objectives of scientific inventory control – Costs associated with inventories – Factors affecting inventory control – An inventory control problem – The concept of EOQ – Deterministic inventory problems with no shortages – Deterministic inventory problems with shortages – Problems of EOQ with price breaks.
Chapter 19 (Sections 19.1 – 19.12)

Unit V	(13 Hours)

Network scheduling by PERT/CPM: Introduction – Network: Basic Components – Logical Sequencing –Rules of Network Construction – concurrent Activities – Critical Path Analysis – Probability Considerations in PERT – Distinction between PERT and CPM .
Chapter 25 (Sections 25.1 – 25.8)

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I -V	Operations Research,	Kantiswarup, P.K. Gupta and Manmohan	Sultan Chand and Sons, New Delhi, 18th Edition, 2015 Reprint

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Operations Research – Theory and Applications	J.K.Sharma,	Macmillan India Ltd, 4th edition, 2012.

| 2 | Operations Research: An Introduction | Hamdy A. Taha | Pearson India Education Pvt. Ltd., 2016 Reprint |

Course Designed by :	**Ms. J.P. Thempaavai**	
Course Reviewed by :	**Ms. J. Priyadharshini**	
Head of the Department :		

Syllabus having direct bearing on Skill Development
B.Sc. Statistics
Semester II
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core Practical I Statistical Practical I	Course Code: 217WP1
Semester: II	No. of Credits: 3
No. of hours : 90 (Total hours)	T:P: 75:15
CIA Max. Marks: 25	ESE Max. Marks: 50

(T:Tutorial, P:Practical)
Course Objectives:
The objectives of this course are to

- demonstrate the features of MS-Excel to handle the Basic Measures of Statistics and Forecasting Techniques.
- Handle the data with ease to compute various statistical measures

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Apply the fundamental concepts in exploratory data analysis using MS Excel.	**A**
CO2	Construct the types of charts using MS Excel.	**A**
ÇO3	Calculate various measures of Descriptive Statistics using MS Excel.	**U**
CO4	Fit curves using MS Excel.	**U**
CO5	Apply the appropriate forecasting techniques to a given data.	**A**
CO6	Predict the price index for a real time data.	**A**

R-Remembrance   U –Understanding   A-Apply

Syllabus:

List of Programs	75 hrs

1. Formation of frequency distribution. Calculation of Arithmetic, Geometric Mean, Median and Mode. Calculation of Percentile.
2. Formation of Charts and Diagrams: Histogram, Bar diagram, Pie diagram Frequency Line, Scatter diagram. Formation of Ogive curves.
3. Calculation of Measures of Dispersion: Range, Variance, Standard Deviation, Mean deviation, Quartiles.
4. Calculation of Skewness and kurtosis.
5. Problems related to curve fitting.
6. Calculation of Correlation and Regression coefficients and formation of Regression lines.
7. Fitting straight line, non-linear trend lines and calculation of trend values using Moving averages.
8. Calculation of Index Numbers.

Course Designed by :	Mrs. S. Saranya	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester III
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core V Probability Distribution I	Course Code: 317W05
Semester: III	No. of Credits: 4
No. of hours : 45 (Total hours)	C:T: 39:6
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are to

- ☐ To gather a strong foundation in the concepts of random variable and a probability distribution.
- ☐ To enable the students to distinguish between discrete and continuous random variables and to identify joint, marginal, conditional probability functions, expectation, conditional expectation and variance, generating functions
- ☐ To enable the students to utilize the functions on law of large numbers and central limit theorem and thereby apply the same.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level

CO1	Identify and predict types of variables.	**A**
CO2	Find the probabilities associated with a discrete probability distribution.	**U**
ÇO3	Compute the joint, marginal and continuous distribution functions for random variables.	**U**
CO4	Interpret the mean of a random variable in terms of the law of large number	**U**
CO5	Calculate the probabilities of mass and density function of random variables.	**U**
CO6	Apply central limit theorem to problems involving sums and averages from probability distributions.	**A**

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	**(8 Hours)**
Random variables – Discrete and Continuous random variables – distribution function – Properties – Probability Mass function and Probability density function – various statistical measures of continuous probability distribution. Book 1: Chapter 5: (Sections 5.1 – 5.4)	

Unit II	**(8 Hours)**
Joint, marginal and conditional distribution functions and density functions – independence of random variables – Transformation of variables (one and two dimensional – concepts only). Book 1: Chapter 5: (Sections 5.5 – 5.7)	

Unit III	**(8 Hours)**
Mathematical Expectation –properties – addition and multiplication theorems – Cauchy-Schwartz inequality, conditional expectation and conditional variance. Book 1: Chapter 6 (fully)	

Unit IV	**(7 Hours)**
Moment Generating function, Cumulant Generating function, characteristic function and their properties. Book 1: Chapter 7:(Sections 7.1 – 7.3)	

Unit V	**(8 Hours)**
Tchebychev's inequality, convergence in probability, weak law of large numbers and central limit theorem. Book 1: Chapter 7: (Sections 7.5 – 7.7) Book 2: Chapter 5: Section: 5.4 (Pages 192–195)	

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I - V	Fundamentals of Mathematical Statistics	Gupta.S.C and Kapoor.V.K	Sultan Chand & sons, 2016 Reprint
V	Introduction to Mathematical Statistics	R.V and Craig.A.G	Amerind Publication, 2004 Reprint.

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. S. Geetha	Dr. S. Geetha
Head of the Department :		

B.Sc. Statistics
Semester III
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Allied III Computer Programming for Statistical Analysis – I	Course Code: 317AW3
Semester: III	No. of Credits: 3
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 50

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are to

- Introduce the programming concepts for statistical analysis
- Enable the use of different types of operators, decision making statements, arrays and functions in the appropriate context.
- Construct programs with a professional outlook that serves to operate on real time data.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Develop simple programs using the basic elements like control statements, arrays and strings.	A
CO2	Apply the concept of arrays to represent statistical data.	A
ÇO3	Illustrate the code reusability with the help of user defined functions.	U
CO4	Use string handling functions to address string oriented problems.	U
CO5	Utilize the structures to represent statistical problems and manipulate the data efficiently.	A

CO6	Develop programs for simple applications in an ethical manner.	**A**

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(13 hours)

Constants, Variables and Data types: Introduction – Character set- C tokens –Keywords and identifiers – Constants- Variables – Data types – Declaration of   variables – Declaration of storage class-Assigning Values to variables – Defining symbolic constants – Declaring a variable as constant – Declaring a variable as Volatile. Operators and Expression: Introduction – Arithmetic operators – Relational operators – Logical operators – Assignment Operators – Increment and decrement operators – Conditional operator – Bit wise operators – Special operators – Arithmetic Expressions – Evaluation of expressions – Precedence of Arithmetic Operators – Some computational problems – Type Conversions in Expressions – Operator precedence and associativity – Mathematical functions.

Chapter 2 and Chapter 3 (Pages 22 – 82)

Unit II	(13 hours)

Managing Input and Output Operations: Introduction – Reading a Character – Writing a character – Formatted Input – Formatted Output. Decision making and branching: Introduction – Decision making with IF statement – Simple IF statement – The IF…ELSE statement – Nesting of IF…ELSE statements – The ELSE IF ladder – The switch statement – The ?: operator – The GOTO statement.

Chapter 4 and Chapter 5 (Pages 83 – 150)

Unit III	(13 hours)

Decision making and looping: Introduction – The WHILE statement – The DO statement – The FOR statement – Jumps in loops. Arrays: Introduction – One dimensional arrays – Declaration of one dimensional arrays – Initialization of One dimensional arrays – Two dimensional arrays – Initializing two dimensional arrays – Multi-dimensional arrays.

Chapter 6 and Chapter 7 (Pages 151 – 236)

Unit IV	(13 hours)

Character arrays and strings: Introduction – Declaring and initializing string variables – Reading strings from terminal – Writing strings to screen – Arithmetic operations on characters – Putting strings together – Comparison of two strings – String handling functions. User-Defined functions: Introduction – Need for user defined functions – A multi-function program –Elements of user defined functions – Definition of functions – Return values and their types – Function calls – Function Declaration – Category of functions – No arguments and no return values – Arguments but no return values – Arguments with return values – No arguments but returns a value – functions that return multiple values – Nesting of functions – Recursion – Passing Arrays to functions – Passing strings to functions – The scope, visibility and lifetime of Variables.

Chapter 8 and Chapter 9 (Pages 237 – 323)

Unit V	(13 hours)
Structures and Unions: Introduction-Defining a Structure – Declaring Structure variables – Accessing Structure members – Structure Initialization Copying and comparing Structure variables – Operations on Individual members – Arrays of Structure – Arrays within Structures – Structures within Structures – Structures and functions – Unions – Size of Structures. Pointers: Introduction – Understanding Pointers – Accessing the Address of a Variable – Declaring Pointer Variables – Initialization of Pointer Variables – Accessing a Variables through its Pointer – Chain of Pointers – Pointer Expressions – Pointer Increments and Scale Factor-Pointers and Arrays – Pointers and Character Strings – Array of Pointers – Pointers as Function Arguments –Functions Returning Pointers –Pointers to Functions – Pointers and Structures – Troubles with Pointers. Chapter 10 and Chapter 11 (Pages 324 – 394)	

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Programming in ANSI C	Balagurusamy. E	Tata McGraw Hill Education Private Limited, Seventh Edition 2017.

Book for Reference:

S.No.	Name of the Book	Authors	Publishers with Edition
1.	Let us C	Yaswant Kanetker	BPB publications New Delhi, 2018 Reprint

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		

B.Sc Statistics
Semester IV
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core VI Probability Distribution – II	Course Code: 417W06
Semester: III	No. of Credits: 4
No. of hours : 60 (Total hours)	C:T: 52:8
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are

- to impart knowledge about discrete and continuous probability distributions.

⬜ to enable the application of concepts of discrete and continuous probability distributions in real life situations.

⬜ to provide skill in computing probabilities using discrete and continuous distributions.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Compute the probabilities associated with discrete distributions.	U
CO2	Find probabilities associated with a normal probability distribution.	U
ÇO3	Approximate the binomial probabilities using a normal distribution and other discrete distributions.	U
CO4	Evaluate the expected value and variance of discrete and continuous probability distributions.	A
CO5	Decide the normal random variable leading to chi square, t and F distributions	U
CO6	Interpret and communicate probabilities obtained from probability distributions.	U

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(10 Hours)

Binomial, Poisson and Negative – Binomial distributions – Moments, m.g.f, cumulants, additive property, recurrence relation for the probabilities – simple problems.

Chapter 8: (Sections 8.4 – 8.6)

Unit II	(11 Hours)

Geometric distribution – moments, m.g.f – Hyper - geometric distribution – mean, variance, m.g.f, Binomial as a limiting form of Hyper - geometric distribution – Multinomial distribution – moments.

Chapter 8: (Sections 8.7 – 8.9)

Unit III	(11 Hours)

Normal distribution – limiting form of Binomial distribution, properties, median, mode, moments, m.g.f, cumulants, mean deviation, area property, simple problems – Rectangular distribution – moments, m.g.f. characteristic function, mean deviation – Bivariate normal distribution.

Chapter 9: (Sections 9.2 & 9.3)

Unit IV	(10 Hours)

Gamma, Beta distributions of I kind and II kind – constants – Exponential distribution – additive property.

Chapter 9: (Sections 9.5 – 9.8)

Unit V	(10 Hours)
Functions of normal random variable leading to χ^2, t and F distributions – inter relationship between the distributions and their properties. Chapter 15: (Sections 15.2 & 15.3), Chapter 16: (Sections 16.2 – 16.6)	

Book for study:

Unit	Name of the Book	Authors	Publishers with Edition
I - V	Fundamentals of mathematical statistics	Gupta. S.C and Kapoor. V.K	Sultan Chand & sons, Reprint 2016

Book for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1.	Introduction to Mathematical Statistics	Hogg R.V and Craig. A.G.,	Amerind, 2004 Reprint.

Course Designed by :	**Mrs.S.Saranya**	
Course Reviewed by :	**Dr. S. Geetha**	**Dr. S. Geetha**
Head of the Department :		

B.Sc. Statistics
Semester IV
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core Practical II Statistical Practical II	Course Code: 417WP2
Semester: IV	**No. of Credits: 3**
No. of hours : 30 (Total hours)	**T:P: 24:6**
CIA Max. Marks: 25	**ESE Max. Marks: 50**

(T: Tutorial, P: Practical)

Course Objectives:

The objectives of this course are

- to provide the skill in applying basic measures of demography, constructing life table and to project the population.
- to solve problems based on discrete and continuous distributions.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Construct a life table used in mortality.	**A**

CO2	Illustrate various demographic techniques.	U
ÇO3	Determine the growth of population.	U
CO4	Fit binomial distribution to a data suitable for binomial distribution.	A
CO5	Fit Poisson distribution appropriately.	A
CO6	Fit Normal distribution using different methods.	A

R-Remembrance   U –Understanding   A-Apply

Syllabus:

List of Problems	26 hrs
Demographic methods:	

Demographic methods:
1. Construction of life table.
2. Determination of mortality, fertility and reproduction rates.
3. Population projection using polynomials and exponential function.
4. Fitting Gompertz curve.
5. Fitting logistic curve to population data by the method of Pearl and Reed.
6. Fitting of Logistic curve by Rhodes method.

Probability and Distributions I & II
1. Fitting of Binomial distribution.
2. Fitting of Poisson distribution.
3. Fitting of Normal distribution by the method of ordinates.
4. Fitting Normal distribution by area method.

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester IV
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Allied IV Computer Programming for Statistical Analysis – II	Course Code: 417AW4
Semester: IV	No. of Credits: 3
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 50

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are
- to introduce the basis of C++ programming.
- to gain capability to develop programs for Statistical problems using OOP's concept

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Describe the significance of object oriented programming.	R
CO2	Illustrate the use of various data types and decision making and looping structures.	R
ÇO3	Demonstrate the use overloading concepts.	U
CO4	Program using constructors.	A
CO5	Build programs classes using appropriate encapsulation and design principles.	A
CO6	Simulate problem in computer networks and real world problems.	A

R-Remembrance U –Understanding A-Apply
Syllabus:

Unit I:	(13 Hours)

Principles of Object Oriented Programming: Basic concepts of Object Oriented Programming – Benefits of OOPS. Beginning with C++ : Applications of C++ – Structure of C++ program. Tokens, Expressions and Control Structures: Introduction –Tokens – Keywords – Identifiers and Constants – Basic data Types – User-Defined Data Types – Derived data types – Symbolic constants – Type Compatibility – Declaration of variables – Dynamic initialization of Variables – Reference Variables – Operators in C++ – Scope Resolution Operator – Member Dereferencing Operators – Memory Management Operators – Manipulators – Typecast Operator – Expressions and their Types – Special Assignment Expressions – Implicit Conversions – Operator Overloading – Operator Precedence – Control Structures.
Chapter 2, Chapter 3 (Pages 19 – 76)

Unit II	(13 Hours)

Functions in C++: Introduction – The Main Function – Function prototyping – Call by Reference – Return by reference – Inline functions – Default arguments – const Arguments – Recursion – Function Overloading – Friend and Virtual Functions – Math Library Functions. Classes and Objects: Introduction – C Structures Revisited – Specifying a Class – Defining Member Functions – A C++ Program with Class – Making an Outside Function Inline – Nesting of Member Functions – Private Member Functions – Arrays within a Class – Memory allocation for Objects – Static Data Members – Static Member Functions – Arrays of Objects – Objects as Function Arguments – Friendly Functions – Returning Objects – const Member Functions – Pointers to Members – Local Classes.

Chapter 4, Chapter 5(Pages 77 – 143)

Unit III	(13 Hours)

Constructors and Destructors: Introduction – Constructors – Parameterized Constructors – Multiple Constructors in a Class – Constructors with Default Arguments – Dynamic Initialization of Objects – Copy constructor – Dynamic Constructors – Constructing Two-Dimensional Arrays – const Objects – Destructors. Operator Overloading and Type Conversions: Introduction – Defining Operator Overloading – Overloading Unary Operators – Overloading Binary Operators – Overloading Binary Operators using Friends – Manipulation of Strings Using Operators – Rules for Overloading Operators – Type Conversions.
Chapter 6, Chapter 7(Pages 144 - 200)

Unit IV	(13 Hours)

Inheritance: Extending Classes: Introduction – Defining Derived Classes – Single Inheritance – Making a Private Member Inheritable – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base Classes – Abstract Classes – Constructors in Derived Classes – Member Classes: Nesting of Classes. Pointers, Virtual Functions and Polymorphism: Introduction – Pointers- Pointers to Objects – this Pointer – Pointers to Derived Classes – Virtual Functions – Pure Virtual functions.
Chapter 8, Chapter 9 (Pages 201 - 289)

Unit V	(13 Hours)

Working with files: Introduction – Classes for File Stream Operations – Opening and Closing a File – Detecting End-of-File – More about Open():File modes – File Pointers and their Manipulations – Sequential Input and Output Operations – Updating a File: Random Access – Error handling During File Operations – Command – Line Arguments. Exception Handling: Introduction – Basics of Exception Handling – Exception Handling Mechanism-Throwing Mechanism – Catching Mechanism – Rethrowing an Exception – Specifying Exceptions.
Chapter 11 (Pages 323 - 358), Chapter 13 (Pages 380 - 400)

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I – V	Object oriented programming with C++	Balagurusamy. E	Tata McGraw Grill, 4th Edition, 2008

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1.	Programming with C++	D. Ravichandran	Tata McGraw Grill, 3rd Edition, 2011

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester IV
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Allied Practical C & C++ Programming	Course Code: 417WAP
Semester: IV	No. of Credits: 2
No. of hours : 30 (Total hours)	T:P: 26:4
CIA Max. Marks: 20	ESE Max. Marks: 30

(T: Tutorial, P: Practical)

Course Objectives:

The objectives of this course are

- to enhance the programming capability to develop programs for statistical problems using C and C++ languages.
- to independently design and execute programs with the help of statistical tools.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Demonstrate frequency distributions.	U
CO2	Compute the various basic measures of descriptive statistics.	U
ÇO3	Sketch straight line using the least square method.	R
CO4	Fit Binomial and Poison distributions.	A
CO5	Perform various matrix operations.	A
CO6	Sort an array of numbers in a specified order.	A

R-Remembrance   U –Understanding   A-Apply

Syllabus:

List of Programs	75 hours
1. Program to form a frequency distribution for the given data $X_1, X_2, X_3 \ldots, X_n$, give the number of class intervals K and the width of the class intervals W. 2. Program to find the arithmetic mean, geometric mean and harmonic mean for the given frequency distribution. 3. Program to find Mean, Variance, Standard Deviation and Coefficient of variation. 4. Program to find the three quartiles Q_1, Q_2 and Q_3 and the coefficient of skewness.	

5. Program to find the first four moments about origin A and to find β_1, β_2, γ_1 and γ_2.

6. Program to find simple correlation and regression coefficients for the given bivariate data.

7. Program to fit a straight line of the form $y = ax + b$ using the principle of least squares to the given bivariate data.

8. Program to fit Binomial distribution.

9. Program to fit a Poisson distribution.

10. Program to arrange one dimensional array of numbers in ascending and descending order.

11. Program to evaluate a matrix polynomial of the type $aX^2+bX+cI$ where X is a matrix of order 3 x 3 and I is an identity matrix and a, b and c are constants.

12. Program to solve the given system of simultaneous equations of three variables.

13. Program to open a file and store data in it and to read and display the data from the file.

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc. Statistics
Semester V
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Skill Enhancement Course III Elements of Econometrics	Course Code: 517WS3
Semester: V	No. of Credits: 4
No. of hours : 75 (Total hours)	C:T: 65:10
CIA Max. Marks: 25	ESE Max. Marks: 75

(C: Contact hours, T: Tutorial)

Course Objectives:

The objectives of this course are

- to create awareness about the underlying concepts of econometrics.
- to enable the students to effectively use the simple and multiple regression models.
- to provide a complete overview of estimating autocorrelation.
- to expose the problems of multicollinearity.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Describe the basic principles of specification of econometric models	R

CO2	Demonstrate an understanding of variations and generalizations of the basic regression models	U
ÇO3	Predict the relationship of the variables based on the value of two or more variables	A
CO4	Find the occurrence of high-inter correlations among independent variable in a multi-regression model	U
CO5	Express consequences of using OLS in the presence of autocorrelation	U
CO6	Explain, interpret, forecast and take policy actions relative to the economic phenomenon of interest	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I:	(7 Hours)

Definition, Scope, Goals and Divisions of Econometrics – Methodology of Econometric Research.
Chapter 1 & 2

Unit II	(8 Hours)

Simple Linear Regression Model – Assumptions – Least Square Criterion and the Normal Equations of OLS – Properties of Least square Estimates – Unbiasedness, Least-Variance, Efficiency, Best Linear Unbiasedness, Least Mean-Square-Error, Sufficiency.
Chapter 4: Sections: 4.1, 4.2, 4.4; Chapter 6: Sections: 6.1.1

Unit III	(8 Hours)

Multiple Regression – Model with two explanatory variables – General Linear Regression Model – Linear and Non-linear Relationships.
Chapter 7: Sections: 7.1, 7.2, 7.4

Unit IV	(8 Hours)

Autocorrelation – Assumptions – Sources – Plausibility – Consequences – Tests for Autocorrelation – The Durbin-Watson Test – Solutions for the case of Autocorrelation – Methods for Estimating Autocorrelation.
Chapter 10: Sections: 10.1 – 10.3, 10.5, 10.6.2, 10.7, 10.8

Unit V	(8 Hours)

Multicollinearity – Assumptions – Plausibility – Consequences – Tests for Detecting Multicollinearity – Solutions for Multicollinearity – Multicollinearity and Prediction – Multicollinearity and Identification.

Chapter 11: Sections: 11.1 – 11.7

Books for study:

Unit	Name of the Book	Authors	Publishers with Edition
I –V	Theory of Econometrics	A. Koutsoyiannis	Macmillan Press, London, 1999 Reprint

Books for Reference:

S. No	Name of the Book	Authors	Publishers with Edition
1	Econometrics	K. Dhanasekaran,	Vrinda Publications (P) Ltd, Delhi, 2011
2	Basic Econometrics	Damodar N. Gujarati	McGraw Hill, Singapore, 2009

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. S. Geetha**	**Dr. S. Geetha**
Head of the Department :		

B.Sc. Statistics

Semester VI

(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part III – Core Practical IV Statistical Practical-IV	Course Code: 617WP4
Semester: VI	**No. of Credits: 4**
No. of hours : 75 (Total hours)	**P:T: 65:10**
CIA Max. Marks: 40	**ESE Max. Marks: 60**

(T: Tutorial, P: Practical))

Course Objectives:

The objectives of this course are

- to enable the students to estimate the parameters of distributions.
- to provide skills to analyze data with reference to basic sampling theory
- to teach the nuances of design of experiments
- to instill a complete knowledge of tests of significance
- to equip the students with simple statistical quality control tools.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Estimate the parameters by using different methods practically.	**U**
CO2	Estimate sample size, mean and variance for different	**U**

	probability sampling methods practically	
ÇO3	Test the significance between the variables using various linear model designs and interpret them statistically.	A
CO4	Fit the hypothesis to test the given samples using various statistical tools.	U
CO5	Check whether the product can be accepted or rejected using various quality control methods.	A
CO6	Utilize the tools to interpret and analyze a real time data with an ethical insight	A

R-Remembrance U –Understanding A-Apply

Syllabus:

Unit I: Statistical Inference-I	(13 Hours)

1. Estimation of parameters of the distribution by the methods of maximum likelihood and moments with regard to discrete and continuous distributions.
2. Confidence intervals based on Single mean, Difference of Means (Large Samples and Small Samples), Single Variance and Ratio of Two Variance.

Unit II Sampling theory	(13 Hours)

1. Estimation of mean and variance of the population and the variance of the estimator of the mean using Simple Random Sampling.
2. Stratified Random Sampling – Estimation of mean and variance of the population and of the variance of the estimator of the mean under Proportional and Optimum Allocation.
3. Systematic Sampling.

Unit III Design of Experiments	(13 Hours)

1. Analysis RBD and LSD lay outs.
2. Missing plot techniques in RBD and LSD.
3. Analysis of $2^2, 2^3$ and 3^2 factorial designs.

Unit IV Statistical Inference-II	(13 Hours)

1. Standard Normal and Exact tests of significance with regard to proportions, mean, variance.
2. Non-parametric Tests: Run test, test for randomness, median test, sign test, Mann-Whitney U Test.

Unit V Statistical quality control	(13 Hours)

1. Control chat for attributes and variables: $\overline{X}$, R, p, np and c charts
2. Single sampling plan and double sampling plan for attributes: OC, AOQ, ASN, ATI curves.

Course Designed by :	Mrs. K. Kaviyamani	
Course Reviewed by :	Dr. G. Uma	Dr. G. Uma
Head of the Department :		

B.Sc Statistics
Semester VI
(For the students admitted during the academic year 2017 – 2018 and onwards)

Course: Part IV – Skill Enhancement Course IV Project	Course Code: 617WS4
Semester: VI	No. of Credits: 3
No. of hours : 45 (Total hours)	C:T: 39:6
CIA Max. Marks: 75	ESE Max. Marks: -

(C: Contact hours, T: Tutorial)

Preamble:

This course is offered with an aim of promoting knowledge. It enables the students to communicate and contribute their ability to enhance their skills. A project work has to be carried out individually in an emerging area and a report must be submitted individually. Viva-voce examination will be conducted.

Course Objectives:

The objectives of this course are

- to create awareness of applications of statistics in various fields and to interpret the results.
- to enable the students to explore various areas of statistical applications.
- to instill confidence to prepare and submit reports.

Course Outcomes: On completion of the Course the student will be able to

CO	Statement	Bloom's Taxonomy level
CO1	Develop, practice and improve technical skills	A
CO2	Apply basic statistical concepts and analytical tools appropriately.	A
ÇO3	Demonstrate the analyzing skills in exploratory data analysis.	U
CO4	Predict results for a current scenario.	A
CO5	Compare two different sets of samples and interpret the result	U
CO6	Propose the scope of research	A

R-Remembrance U –Understanding A-Apply

Course Designed by :	**Mrs. S. Saranya**	
Course Reviewed by :	**Dr. G. Uma**	**Dr. G. Uma**
Head of the Department :		