

THIRUVALLUVAR UNIVERSITY

BACHELOR OF SCIENCE

B.Sc. STATISTICS

DEGREE COURSE

(With effect from 2020 - 2021)

The Course of Study and the Scheme of Examinations

S. No.	Part	Study Components		Ins. Hrs / week	Credit	Title of the Paper	Maximum Marks		
		Course Title					CIA	Uni. Exam	Total
SEMESTER I									
1	I	Language	Paper-1	6	4	Tamil/Other Languages	25	75	100
2	II	English (CE)	Paper-1	6	4	Communicative English I	25	75	100
3	III	Core Theory	Paper-1	6	4	Descriptive Statistics	25	75	100
4	III	Core Practical	Practical-1	4	0	Statistical Practical-I	0	0	0
5	III	Allied -1	Paper-1	6	3	Mathematics-I	25	75	100
6	III	PE	Paper 1	6	3	Professional English I	25	75	100
7	IV	Environmental Studies		2	2	Environmental studies	25	75	100
		Sem. Total		36	20		150	450	600
SEMESTER II									
8	I	Language	Paper-2	6	4	Tamil/Other Languages	25	75	100
9	II	English (CE)	Paper-2	6	4	Communicative English II	25	75	100
10	III	Core Theory	Paper-2	5	4	Probability and Random Variables	25	75	100
11	III	Core Practical	Practical-1	3	2	Statistical Practical-I	25	75	100
12	III	Allied-1	Paper-2	6	5	Mathematics-II	25	75	100
13	III	PE	Paper 1	6	3	Professional English II	25	75	100
14	IV	Value Education		2	2		25	75	100
15	IV	Soft Skill		2	1		25	75	100
		Sem. Total		36	25		200	600	800

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SEMESTER I

CORE PAPER - 1

DESCRIPTIVE STATISTICS

Course Objective(s)

To enable students to gain knowledge about descriptive statistics such as functions of statistics, measures of location and dispersion, correlation and regression.

UNIT - I

Nature and scope of statistical methods and their limitations - preparation of questionnaire and schedule - Primary and Secondary sources of data - nominal, ordinal, ratio and interval scale - complete enumeration, controlled experiment, observational studies & sample surveys, Sources of secondary data including some Government publications.

UNIT – II

Presentation by tables and by diagrams- Construction of tables with one, two and three factors of classifications - Diagrammatic representations, frequency distributions for continuous and discrete data, graphical representation of a frequency distribution by histogram and frequency polygon, cumulative frequency distributions (inclusive and exclusive methods) and Ogives.

UNIT – III

Measures of Location – mean, median, mode - Measures of dispersion, moments, measures of skewness and kurtosis for both grouped and ungrouped data.

UNIT – IV

Scatter diagram, regression lines and concept of error in regression, principle of least squares and fitting of first, second degree and exponential curves, concept of correlation co-efficient and its properties. Spearman's rank correlation. Regression Equations.

UNIT – V

Fundamental set of frequencies, Consistency of data, conditions for consistency, contingency table, association of attributes.

Text Books:

1. Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
2. Hoel, P.G. (1971): Introduction to Mathematical Statistics, Asia Publishing House.
3. Goon, AM., Gupta M.K and Dasgupta B (1991): Fundamentals of Statistics, Vol.1, World Press, Calcutta.
4. Bhat B.R, Srivenkataramana T, and Madhava K.S,(1996) Statistics: A Beginner's text Vol. I, New Age International (P) Ltd.
5. Gupta,S.P. (2014):Statistical Methods, Sultan Chand & Sons Pvt Ltd. New Delhi.

Reference Books:

1. G.U.Yule and M.G. Kendall (1956): An introduction to the theory of Statistics, Charles Griffin.
2. M.R. Spiegel (1961): Theory and problems of statistics, Schaum's outline series.
3. Snedecor .G.W. and Cochran W.G. (1967): Statistical methods, Iowa State University Press.
4. Anderson, T.W. and Sclove SL. (1978): An introduction to statistical analysis of data, Houghton Mifflin/co.
5. Croxton FE, and Cowden D.J. (1973) Applied General Statistics, Printice Hall of India.

Course Outcomes

1. After studied unit-1, the student will be able to know methods of data collection
2. After studied unit-2, the student will be able to know various techniques of presentation of data
3. After studied unit-3, the student will be able to know measures of location and dispersion
4. After studied unit-4, the student will be able to know correlation and regression
5. After studied unit-5, the student will be able to know association of attributes

ALLIED 1
PAPER -1
MATHEMATICS I

Objectives of the Course:

To Explore the Fundamental Concepts of Mathematics

UNIT-I: ALGEBRA

Partial Fractions - Binomial, Exponential and logarithmic Series (without Proof) - Summation - Simple problems

UNIT-II : THEORY OF EQUATIONS

Polynomial Equations with real Coefficients - Irrational roots - Complex roots-Transformation of equation by increasing or decreasing roots by a constant - Reciprocal equations - Newton's method to find a root approximately - Simple problems.

UNIT-III : MATRICES

Symmetric - Skew-Symmetric - Orthogonal and Unitary matrices - Eigen roots and eigen vectors – Cayley - Hamilton theorem (without proof)-Verification and computation of inverse matrix

UNIT-IV: TRIGONOMETRY

Expansions of $\sin^n \theta$, $\cos^n \theta$, $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin \theta$, $\cos \theta$, $\tan \theta$ in terms of θ .

UNIT-V: DIFFERENTIAL CALCULUS

Successive differentiation upto third order, Jacobians -Concepts of polar co-ordinates-Curvature and radius of curvature in Cartesian co-ordinates and in polar co-ordinates.

Recommended Text:

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai.

Reference Books:

1. P.Balasubramanian and K.G.Subramanian,(1997) *Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II. VikasPublications, New Delhi.
3. P.R.Vittal (2003) *Allied Mathematics* .Marghan Publications, Chennai
4. P.Kandasamy, K.Thilagavathy (2003) *Allied Mathematics Vol-I, II* S.Chand& company Ltd., New Delhi-55.
5. Isaac, *Allied Mathematics*. New Gamma Publishing House, Palayamkottai.

SEMESTER II
CORE PAPER - 2
PROBABILITY AND RANDOM VARIABLES

Course Objective(s)

Enable the students to understand and study random phenomena mathematically

UNIT – I

Random experiment, sample point, sample space, event, algebra of events, operations on events. Classical and relative frequency approach to probability - axiomatic approach to probability. Simple problems.

UNIT – II

Addition theorem of probability, conditional probability, independence of events multiplication theorem - Bayes theorem and its applications.

UNIT – III

Definition of discrete and continuous random variables-Distribution functions - probability mass function, probability density functions and their properties. Expectation of random variables and its properties – Chebychev’s inequality – simple problems.

UNIT – IV

Moment generating function, characteristic function, cumulant generating function - their properties, moments, measures of locations, dispersion, Skewness and Kurtosis for discrete and continuous variates. Simple problems

UNIT – V

Bivariate distributions - discrete and continuous type, cumulative distribution function - probability mass function - probability density function - Marginal and Conditional expectation.

Text Books:

1. A.M.Mood, F.A. Graybill and D.C. Boes (1974): Introduction to the theory of Statistics, International student ed. McGraw Hill.
2. Hogg, R.V. and Craig, A.T. (1998): Introduction to Mathematical Statistics, 4th ed. Academic Press.
3. A.M.Goon, M.K.Gupta & B. Dasgupta (1980): An outline of Statistical theory, Vol. I, 6th revised, World Press.
4. Gupta, S.C. and V.K. Kapoor (2014): Fundamentals of Mathematical Statistics, Sultan Chand & Sons.

Reference Books:

1. Rohatgi, V.K. (1984): An introduction to probability theory and mathematical statistics.
2. P.G.Hoel (1971): Introduction to Mathematical Statistics, Asia publishing

house.

3. Murry R. Spiegel (1982): Theory and problems of Probability and Statistics, Schaum's outline series, McGraw Hill.
4. Seymour Lipshutz (1982): Theory and problems of probability, Schaum's outline series, McGraw Hill.
5. Marek Fisz (1961): Probability theory and Mathematical Statistics, John Wiley.
6. K.L.Chung (1983): Elementary probability theory with stochastic processes, Springer International student edition.
7. William.Feller (1968): An introduction to probability theory and its applications, Vol. I, 3rd ed., John Wiley & Sons.

Course Outcomes

- 1. After studied unit-1, the student will be able to know** the concept of probability
- 2. After studied unit-2, the student will be able to know** Bayesian formula and its applications
- 3. After studied unit-3, the student will be able to know** random variables and its properties
- 4. After studied unit-4, the student will be able to know** moment generating function and computation of moments
- 5. After studied unit-5, the student will be able to know** bivariate distributions and related features

CORE PRACTICAL-1

STATISTICAL PRACTICAL-I Credits

Course Objective(s)

To enable students to solve problems related to descriptive statistics and probability

Problems relating to the following topics which are covered in the core papers in the Semester I and Semester II shall form the basis for practical:

1. Construction of Uni-variate, bi-variate frequency distributions.
2. Diagrammatic and graphical representations, Ogives, Lorenz curves.
3. Measures of location and dispersion.
4. Measures of skewness and kurtosis for both grouped and ungrouped data. Measures of skewness and kurtosis using moments.
5. Principle of least squares and fittings of first, second degree and exponential curves.
6. Computation of correlation co-efficient. Rank correlation, and fitting regression equations.
7. Construction of contingency table. Association of Attributes.
8. Joint Probability mass function, Joint probability density function, Marginal probability mass and density functions. Expectation, variance and Correlation coefficient.

Text Books

Books prescribed in the respective core papers shall be used.

Note

The maximum marks for continuous internal assessment and end semester University examination for Statistical Practical-I shall be fixed as 40 and 60, respectively. The continuous internal assessment shall involve test (25 marks) and record work (15 marks). The question paper at the end semester examination shall consist of **four questions with internal choice**. A candidate shall attend all the four questions, each of which shall carry 15 marks.

ALLIED 1
PAPER -2
MATHEMATICS II

Objectives of the Course

To Explore the Fundamental Concepts of Mathematics

UNIT-I: Application of Integration

Evaluation of double, triple integrals - Simple applications to area, volume - Fourier series for functions in $(0, 2\pi)$ and $\square\square\square\square\square\square\square\square$

UNIT-II: Partial Differential Equations

Formation, complete integrals and general integrals - Four standard types, Lagrange's equations.

UNIT-III: Laplace Transforms

Laplace Transformations of standard functions and simple properties - Inverse Laplace transforms - Applications to solutions of linear differential equations of order 1 and 2-simple problems

UNIT-IV: Vector Analysis

Scalar point functions - Vector point functions - Gradient, divergence, curl - Directional derivatives - Unit to normal to a surface.

UNIT-V: Vector Analysis (continued)

Line and surface integrals - Gauss, Stoke's and Green's theorems (without proofs) - Simple problem based on these Theorems.

Recommended Text

P.Duraipandian and S.Udayabaskaran,(1997) *Allied Mathematics*, Vol. I & II.Muhil Publishers, Chennai

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1. P.Balasubramanian and K.G.Subramanian,(1997)*Ancillary Mathematics*. Vol. I & II. Tata McGraw Hill, New Delhi.
2. S.P.Rajagopalan and R.Sattanathan,(2005) *Allied Mathematics* .Vol. I & II.Vikas Publications, New Delhi.
3. P.R.Vittal(2003). *Allied Mathematics* .Marghan Publications, Chennai.
4. P.Kandasamy, K.Thilagavathy (2003) *Allied Mathematics Vol-I, II* S.Chand& company Ltd., New Delhi-55.
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