ANNAMALAI UNIVERSITY

202 - B.Sc. STATISTICS

Programme Structure and Scheme of Examination (under CBCS)
(Applicable to the candidates admitted in Affiliated Colleges from the academic year 2022 -2023 onwards)

Course Code	Part	Study Components & Course Title	Hours /Week	Credit	Maximum Marks		
					CIA	ESE	Total
		SEMESTER – I					
22UTAML11	I	Language Course - I : Tamil/Other Languages	5	3	25	75	100
22UENGL12	II	English Course - I : Communicative English I	5	3	25	75	100
22USTAC13	III	Core Course – I: Descriptive Statistics	5	4	25	75	100
22USTAC14		Core Course – II: Probability Theory	5	4	25	75	100
		Core Practical – I: Statistical Practical - I	3	-	-	-	-
		Allied Course - I: Paper -1Mathematics - I	5	4	25	75	100
22UENVS18	IV	Environmental Studies	2	2	25	75	100
		Total	**30**	**20**			**600**
		SEMESTER – II					
22UTAML21	I	Language Course - II: Tamil/Other Languages	5	3	25	75	100
22UENGL22	II	English Course - II: Communicative English II	5	3	25	75	100
22USTAC23	III	Core Course – III: Distribution Theory I	5	4	25	75	100
22USTAP24		Core Practical – I:Statistical Practical - I	3	4	40	60	100
		Allied Course - I: Paper -2 Mathematics - II	5	4	25	75	100
22USTAE24		Internal Elective – I	3	3	25	75	100
22UVALE27	IV	Value Education	2	1	25	75	100
22USOFS28		Soft Skill	2	1	25	75	100
		Total	**30**	**23**			**800**

Internal Elective Courses

22USTAE24-1	Internal Elective – I	Quantitative Aptitude
22USTAE24-2		Database Management System
22USTAE24-3		Mathematical Statistics

Allied Courses offerd by the Department of Statistics

22USTAA01	Theory	Statistical Methods and their Applications
22USTAA02	Theory	Business Statistics (for B.Com.)

SEMESTER: I PART: III	22USTAC13: DESCRIPTIVE STATISTICS (CORE COURSE – I)	CREDIT:4 HOURS/week:5

COURSE OBJECTIVES

1) To emphasis and enhance the basic statistical knowledge of the fresh students.
2) To have knowledge on various statistical measures.

Unit I: Introduction **Hours: 12**

Origin and Scope of Statistics; Definition of Statistics; Functions of Statistics; Applications of Statistics; Limitations of Statistics; Various types of Data; Nominal, Ordinal, Ratio Scale and Interval; Primary and Secondary Data; Methods of Collecting Primary Data; Drafting the questionnaire.

Unit II: Classification of Statistical Data **Hours:12**

Object of classification; Types of Classification; Formation of a Discrete Frequency Distribution; Formation of Continuous Frequency Distribution; Tabulation of data; Diagrammatic presentation of data; Graphs of Frequency Distribution; Histogram; Frequency Polygon; Ogives.

Unit III: Univariate measures **Hours:12**

Measures of Central Tendency; Objectives of Averaging; Requisites of a Good Average; Mean; Median; Mode; Geometric Mean; Harmonic Mean; Computation of Quartiles; Percentiles; Measures of Dispersion –Range; Mean Deviation; Standard Deviation; Co-efficient of Variation – Lorenz curve.

Unit IV: Moments **Hours:12**

Non-central moments; Central moments; Relationship between non-central and central moments; Measures of skewness; Karl Pearson's coefficient of skewness; Bowley's coefficient of skewness; Measures of Kurtosis; Types of Kurtosis.

Unit V: Bi-variate measures **Hours:12**

Scatter diagram Correlation; Types of Correlation; Methods of studying correlation; Karl Pearson's coefficient of correlation; Properties of coefficient of correlation; Rank correlation coefficient; Regression; regression equations; types of regression; uses of regression.

COURSE OUTCOMES

At the end of the course, the student will be able to:

1) Study the basic concepts of statistics and data.
2) Have knowledge on various diagrams and graphs.
3) Calculate various measures of averages and dispersion
4) Study the various measures of skewness and kurtosis.
5) Study the measures of bivariate data

Text Books (In API Style)

1) Gupta, S. C and Kapoor V. K. (2007). *Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi.
2) Gupta, S. P.(2007). *Statistical Methods,* Sultan Chand & Sons, New Delhi.
3) Goon Gupta, A. M. and Das Gupta. (1994).*Fundamentals of Statistic,* (Vol - I) Central Publisher, Calcutta.

Supplementary Readings

1) Senthamaraikannan, K. and Venkatesan, D. (2006). *Introduction to Statistical Methods*, Scitech Publishers, Chennai.

OUTCOME MAPPING

Cos	PO1	PO2	PO3	PO4	PO5
CO1	3	2	1	3	1
CO2	2	3	2	1	1
CO3	2	2	3	2	1
CO4	3	3	3	2	2
CO5	3	3	3	2	2

1:Low 2: Moderate 3: High

SEMESTER: I PART: III	22USTAC 23: PROBABILITY THEORY (CORE COURSE – II)	CREDIT:4 HOURS/week:5

COURSE OBJECTIVES

1) To study the basic concepts for promoting theoretical as well as applications of statistics.
2) To study the limit theorems and convergence in probability.

Unit I: Probability **Hours: 12**

Sample space – Events - algebraic operations on events. Definitions - Classical Probability, Statistical Probability, Axiomatic approach to probability - Independent events – Conditional probability -- Addition and Multiplication theorems of probability –Bayes Theorem.

Unit II: Random variables **Hours:12**

Discrete and continuous random variables –Distribution function- properties – Probability mass function and Probability density function – Discrete and continuous probability distributions.

Unit III: Multiple Random Variables **Hours:12**

Joint, marginal and conditional distributionsindependence of random variables –Transformation of random variables (one and two dimensional) and determination of their distributions.

Unit IV: Mathematical Expectation **Hours:12**

Expectation – Properties, Cauchy-Schwartz inequality, conditional expectation and conditional variance – theorems on expectation and conditional expectation. Moment generating function, cumulant generating function, characteristic function, probability generating function and their properties, Chebychev's inequality

Unit V: Limit Theorems **Hours: 12**

Convergence in probability, weak law of large numbers - Bernoulli's theorem, Khintchine's theorem (Statements only) – Simple form of Central limit theorem for i.i.d random variables.

COURSE OUTCOMES

At the end of the course, the student will be able to:

1) Study the various concepts of probability
2) Understand a random variables probability functions.
3) Study the bivariate probability functions.
4) Understand the mathematical expectations and related functions.
5) Study the law of large numbers.

Text Books (In API Style)

1) Gupta, S.C. and Kapoor, V. K. (1982).*Fundamentals of Mathematical Statistics*, Sultan Chand & Sons, New Delhi.
2) Hogg, R.V. and Craig, A. G. (1978).*Introduction to Mathematical Statistics*,
3) MacMillan,London.

4) Mood, A.M.., Graybill, F. A.andBoes, D. C. (1974). *Introduction to Theory of Statistics*, TataMcGraw Hill, New Delhi.
5) Goon, A.M., Gupta, M.K. and Das Gupta, B. (1993).*Fundamentals of Statistics,*Vol. I. World Press, Kolkata.

Supplementary Readings

1) Lipschutz, S. (2008).*Probability Theory* (Second Edition), Schaum'sOutline Series, McGraw Hill, New York.
2) Spiegel, M.R. and Ray, M. (1980).*Theory and Problems of Probability and Statistics*, Schaum's Outline Series, McGraw Hill, New York.

OUTCOME MAPPING

Cos	PO1	PO2	PO3	PO4	PO5
CO1	3	2	2	3	2
CO2	3	3	2	2	2
CO3	3	3	2	2	3
CO4	2	2	3	3	2
CO5	2	1	3	2	1

1:Low 2: Moderate 3: High

SEMESTER: I PART: III	22USTAP15: STATISTICAL PRACTICAL– I (CORE PRACTICAL – I)	CREDIT: HOURS:3

COURSE OBJECTIVES

1. To acquire the knowledge to solve problems related to descriptive Statistics.
2. To acquire the knowledge to solve problems related to Probability.

Practical Schedule: -(Based on Core Paper 1 and 2) **Hours: 36**

1) Calculation of Mean, Median, Mode, Geometric Mean and Harmonic Mean for raw data.
2) Calculation of Mean, Median and Mode for discrete data.
3) Calculation of Mean, Median and Mode for frequency distribution with Class Intervals.
4) Calculation of raw and central moments for raw data.
5) Calculation of raw and central moments for frequency distribution.
6) Calculation of range, Quartile Deviation, Standard Deviation, Mean Deviation, Coefficient of Variation and Variance for raw data.
7) Calculation of range, Quartile Deviation, Standard Deviation, Mean Deviation, Coefficient of Variation and their relative measures for frequency distribution.
8) Calculation of Pearson's, Bowley's Coefficient of Skewness and Kelly's Coefficient of Skewness.
9) Calculation of Simple Correlation, Rank Correlation and Regression Coefficients.
10) Forming of Regression Lines and Predictions from Bivariate Data.
11) Construction of contingency table.
12) Association of Attributes.
13) Join Probability mass function, Join probability density function, Marginal probability mass and density functions.
14) 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.

OUTCOME MAPPING

Cos	PO1	PO2	PO3	PO4	PO5
CO1	2	2	3	3	2
CO2	1	2	3	3	2
CO3	2	3	3	3	3
CO4	2	2	3	3	2
CO5	3	2	3	3	3

SEMESTER: II PART: III	22USTAC33: DISTRIBUTION THEORY I (CORE COURSE – III)	CREDIT:4 HOURS:4/week

COURSE OBJECTIVES

1) To build probability models for non-mathematical forms of real-life problems into mathematical forms.
2) To emphasize relevance statistical tools to make decision on the real life problems.
3) To have practical knowledge on fitting of various distributions.

Unit I: **Hours: 10**

Probability distributions. , introduction, Bernoulli Distribution,mean, variance, moment generating function , Binomial distribution, ,mean and variance of binomial distribution, factorial moments of Binomial distribution, Moment generating function, Characteristic function, cumulant Generating Function .Fitting of Binomial distribution, additive property of binomial distribution, Recurrence relations for probabilities of binomial distribution, simple problems

Unit II: **Hours:10**

Poisson distribution, characteristics of Poisson distribution ,mean and variance of Poisson distribution, factorial moments of Poisson distribution, Moment generating function, Characteristic function, cumulant Generating Function .Fitting of Poisson distribution, additive property of Poisson distribution, Recurrence relations for probabilities of Poisson distribution, simple problems

Unit III: **Hours:10**

Negative binomial distribution ,derivation of Negative binomial distribution from Binomial distribution, Moment generating function,Cumulant generating function, Probability generating function of Negative binomial distribution, moments of negative binomial distribution, Fitting of negative binomial distribution,simple problems

Unit IV:

Geometric distribution, Lack of memory, moments , and moment generating function of geometric distribution, Discrete Uniform Distribution, mean, variance ,moment generating function, simple problems

Unit V: **Hours:8**

Hyper geometric distribution, Multinomial distribution and - Moments, Moment generating function, Characteristic function, Cumulant Generating Function of multinomial distribution, Generalised Power series distribution, Particular case of g.p.s.d.

COURSE OUTCOMES

At the end of the course, the student will be able to:

1) Understand the binomial Poisson distributions.
2) Study the Poisson distributions.
3) Study the negative Binomial distributions
4) Study the geometric distributions.
5) Study the hyper geometric distributions.

Text Books (In API Style)

1) Hogg, R.V. and Craig, A. G. (1978).*Introduction to Mathematical Statistics*, MacMillan, London.
2) Mood, A.M.,Graybill, F.A. and Boes, D.C(1974).*Introduction to Theory of Statistics*, Tata McGraw Hill, New Delhi
3) Goon, A.M., Gupta M.K. and Das Gupta, B. (1993).*Fundamentals of Statistics,* Vol. I. World Press, Kolkata.
4) Goon, A.M., Gupta M.K. and Das Gupta, B. (1993).*Fundamentals of Statistics,* Vol. I. World Press, Kolkata.
5) Gupta, S.C and Kapoor, V. K. (1982).*Fundamentals of Mathematical Statistics*, Sultan Chand& Sons, New Delhi.

Supplementary Readings

1) Spiegal, M.R. (1982).*Theory and problems of Probability and Statistics*, Schaum's outline series, McGraw Hill, New York.
2) Spiegel, M.R. and Ray, M(1980).*Theory and Problems of Probability and Statistics*, Schaum'sOutline Series, McGraw Hill, New York.
3) AbhijitGuha. *Quantitative Aptitude by Competitive Examinations,* 4th edition.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	3
CO3	2	2	3	3	3
CO4	2	3	3	2	2
CO5	2	3	2	3	2

SEMESTER: II PART:	22USTAE24: (A) QUANTITATIVE APPTITUDE	CREDIT:3 HOURS:3/week

COURSE OBJECTIVES

1) This course is designed to suit the need of the outgoing students. and
2) To acquaint them with frequently asked patterns in quantitative aptitude
3) To acquaint them with logical reasoning during various examinations and campus interviews.

Unit I:

Ratio And Proportion, Percentages, Square root and Cube Root, Lowest Common Multiple (LCM) and Highest Common Factor (HCF).

Unit II:

Logarithm, Permutation and Combinations, Simple Interest and Compound Interest.

Unit III:

Time and Work, Time, Speed and Distance.

Unit IV:

Data Interpretation, Tables, Column Graphs, Bar Graphs and Venn Diagrams.

Unit V:

Blood Relation, Coding and Decoding, Calendars and Seating Arrangements.

COURSE OUTCOMES

On successful completion of the course the students will be able to:

1) Understand the basic concepts of quantitative ability
2) Understand the basic concepts of logical reasoning Skills
3) Acquire satisfactory competency in use of reasoning
4) Solve campus placements aptitude papers covering Quantitative Ability, Logical Reasoning Ability.
5) 5. Compete in various competitive exams like CAT, CMAT, GATE, GRE, GATE, UPSC, GPSC etc.

Text Books (In API Style)

1) Agarwal , R. S. A Modern Approach To Verbal & Non Verbal Reasoning
2) Sijwali, B. S. Analytical and Logical reasoning.
3) Agarwal , R. S. Quantitative aptitude for Competitive examination.

Supplementary Readings

1) Sijwali, B. S. Analytical and Logical reasoning for CAT and other management entrance test
2) AbhijitGuha. Quantitative Aptitude by Competitive Examinations, 4th edition.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	**2**	**3**	**2**	**2**	**3**
CO2	**2**	**2**	**2**	**3**	**3**
CO3	**2**	**2**	**3**	**3**	**3**
CO4	**2**	**3**	**3**	**2**	**2**
CO5	**2**	**3**	**2**	**3**	**2**

SEMESTER: II PART:	22USTAE24:(B) DATA BASE MANAGEMENT SYSTEM	CREDIT:3 HOURS:3/week

COURSE OBJECTIVES

1) To enable the students to understand classifying and grouping and retrieve the mass data.

Unit I:

Introduction – DBMS Basic Concepts – Purpose of Database Systems – Database System/ File System – Overall System architecture – Database Languages – Classifications – Data Models.

Unit II:

Entity relationship model: Mapping constraints – Primary Keys – Foregin Key – Structural Constraints – ER notations- ER model examples – Enhanced Entity Relationship Model: EER Concepts like Generalization, Specialization, Union, Category, Disjoint, Overlappingetc.EER model examples.

Unit III:

Relational Data Base Design – ER/EER to Relational Mapping algorithm – Relational Model: Structure – Formal Query Languages – Relational Algebra – Informal Design Guidelines – Functional Dependencies – Normalization upto third Normal Form.

Unit IV:

SQL – Basics of SQL – DDL – DML – DCL – TCL Commands in detail with examples.

Unit V:

PL/SQL: Stored Procedure Concepts – Procedure – Functions – Cursors – Triggers.

COURSE OUTCOMES

At the end of the course, the student will be able to:

1) Study the introduction of DBMS concepts.
2) Understand the concept of Entity relationship model.
3) Understand the concept of Relational Data Base Design.
4) Study SQL.
5) Study PL/SQL.

Text Books (In API Style)

1) Korth, H. F. and Silberschatz, A. (1988).*Database system Concept*, McGraw Hill Publication.
2) Albert Lulushi (1997). *Developing ORACLE FORMS Applications*, Prentice Hall.

Supplementary Readings

1) Srinivasan, K. (1998).Basic Demographic Techniques and Applications.

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	3	2	2	3
CO2	2	2	2	3	3
CO3	2	2	3	3	3
CO4	2	3	3	2	2
CO5	2	3	2	3	2