SVA GOVERNMENT COLLEGE , SRIKALAHASTI

DEPARTMENT OF STATISTICS

Program Outcomes (POs) for B.Sc. Statistics

Program Outcomes describe the broad competencies that students should achieve upon completing the B.Sc. Statistics program. These are aligned with the knowledge, skills, and attributes expected of graduates.

- **PO1: Statistical Knowledge**
  Apply theoretical and applied statistical concepts, methods, and tools to solve real-world problems in data analysis, interpretation, and decision-making.
- **PO2: Analytical and Problem-Solving Skills**
  Develop critical thinking and analytical skills to evaluate numerical and empirical data, formulate hypotheses, and derive meaningful conclusions.
- **PO3: Computational Proficiency**
  Utilize statistical software and computational tools to perform data analysis, modeling, and visualization effectively.
- **PO4: Research and Inquiry**
  Design and conduct statistical investigations, including surveys and experiments, and interpret results to contribute to research and innovation.
- **PO5: Communication Skills**
  Communicate statistical findings clearly and effectively to diverse audiences through written, oral, and visual presentations.
- **PO6: Professional and Ethical Responsibility**
  Demonstrate ethical practices in data collection, analysis, and reporting, adhering to professional standards in statistical applications.
- **PO7: Lifelong Learning**
  Engage in continuous learning to adapt to evolving statistical methodologies and technologies in a global context.

Program Specific Outcomes (PSOs) for B.Sc. Statistics

Program Specific Outcomes focus on the unique competencies specific to the B.Sc. Statistics discipline, emphasizing technical expertise and career readiness.

- **PSO1: Mastery of Statistical Techniques**
  Demonstrate proficiency in descriptive and inferential statistical methods, probability theory, and their applications in diverse fields such as economics, biology, and social sciences.
- **PSO2: Data-Driven Decision Making**
  Apply statistical tools and probability models to analyze data and support decision-making in industries like banking, government, and research.
- **PSO3: Industry and Research Readiness**
  Acquire practical skills through projects, internships, and hands-on activities to pursue careers as data analysts, statisticians, or researchers, or to undertake advanced studies.

Course Outcomes (COs) for "Descriptive Statistics and Probability" (Semester II)

Course Outcomes specify what students will be able to do upon completing the "Descriptive Statistics and Probability" course. These are tailored to the Semester II curriculum, which typically introduces foundational statistical concepts and probability theory.

- **CO1**
  Calculate and interpret measures of central tendency (mean, median, mode), dispersion (range, variance, standard deviation), and shape (skewness, kurtosis) to summarize data effectively.
- **CO2**
  Apply graphical and numerical methods (e.g., histograms, box plots, scatter diagrams) to present and analyze univariate and bivariate data.
- **CO3**
  Understand and apply basic probability concepts, including axioms, conditional probability, and Bayes' theorem, to solve real-world problems.
- **CO4**
  Analyze probability distributions (discrete and continuous, e.g., binomial, normal) and compute expected values, moments, and probabilities for decision-making.
- **CO5**
  Use statistical software (e.g., R, Excel, or TinkerPlots) to perform descriptive statistical analysis and probability computations, enhancing computational skills.

- **CO6**
  Communicate statistical results and probability-based conclusions clearly through reports and presentations, adhering to ethical data representation practices.

Mapping of Course Outcomes (COs) to Program Outcomes (POs) and Program Specific Outcomes (PSOs)

The mapping demonstrates how the course contributes to achieving the broader program goals. The strength of the correlation is indicated as follows:

- **3**: High correlation
- **2**: Moderate correlation
- **1**: Low correlation
- **-**: No correlation

Mapping Table: COs to POs and PSOs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	1	1	2	1	3	2	1
CO2	3	3	3	2	2	2	1	3	2	2
CO3	3	2	1	2	1	1	2	3	3	1
CO4	3	3	2	2	1	2	2	3	3	2
CO5	2	2	3	2	2	2	2	2	2	3
CO6	1	1	2	2	3	3	2	1	2	2

Explanation of Mapping:

- **CO1 (Descriptive Measures)**: Strongly aligns with PO1 (statistical knowledge), PO2 (analytical skills), and PSO1 (mastery of statistical techniques) as it focuses on foundational statistical computations.
- **CO2 (Graphical Methods)**: Contributes significantly to PO3 (computational proficiency) and PSO1, as it involves data visualization tools, with moderate alignment to PO5 (communication) for presenting results.
- **CO3 (Probability Concepts)**: Highly relevant to PO1 and PSO1 for theoretical understanding, and PSO2 for decision-making applications, with moderate research alignment (PO4).

- **CO4 (Probability Distributions)**: Strongly supports PO1, PO2, PSO1, and PSO2, as it builds analytical skills for probability modeling, with moderate research and computational applications.
- **CO5 (Software Use)**: Emphasizes PO3 and PSO3 (industry readiness) due to hands-on software skills, with moderate contributions to other POs and PSOs.
- **CO6 (Communication)**: Directly aligns with PO5 (communication) and PO6 (ethical responsibility), with moderate contributions to PSO2 and PSO3 for professional reporting skills.

Course Outcomes (COs) for Semester IV Courses

Course 3: Analysis and Design of Experiments

Based on the syllabus (Units 1–5 for Theory and Practical components), the COs reflect the learning outcomes provided in the document, rephrased for clarity and alignment with OBE.

- **CO1**
  Explain the role of statistics in agriculture and apply statistical methods, including Analysis of Variance (ANOVA), to analyze experimental data in agricultural contexts.
- **CO2**
  Design and implement Completely Randomized Design (CRD) experiments, applying randomization principles and performing statistical analysis to interpret results.
- **CO3**
  Apply Randomized Block Design (RBD) in experimental setups, analyze data, handle missing observations, and evaluate its efficiency relative to CRD.
- **CO4**
  Utilize Latin Square Design (LSD) for experiments, conduct statistical analysis, address missing values, and compare its efficiency with CRD and RBD.
- **CO5**
  Analyze factorial experiments (2^2 and 2^3) in RBD layouts, compute main and interaction effects using Yates' procedure, and interpret results for agricultural applications.
- **CO6**
  Use Excel for statistical analysis of experimental designs (CRD, RBD, LSD, factorial experiments), export results to MS Word, and communicate findings effectively with ethical reporting practices.

Course 4: Numerical Analysis

Based on the syllabus (Units 1–5 for Theory and Practical components), the COs are derived from the provided learning outcomes, refined for specificity and OBE compliance.

- **CO1**
  Apply finite difference operators (Δ, ∇, E) and their properties to construct difference tables, estimate missing values, and solve problems using the fundamental theorem of finite differences.
- **CO2**
  Perform interpolation using Newton's forward, backward, and divided difference formulae, as well as Lagrange's formula, for equal and unequal intervals.
- **CO3**
  Utilize central difference formulae (Gauss, Stirling, Bessel, Laplace-Everett) to interpolate data and solve numerical problems accurately.
- **CO4**
  Compute first and second-order derivatives using numerical differentiation techniques, including Newton's, Gauss', Stirling's, and divided difference methods.
- **CO5**
  Apply numerical integration methods (Trapezoidal, Simpson's 1/3rd, Simpson's 3/8th, Weddle's rules) to evaluate integrals for equidistant data points.
- **CO6**
  Implement interpolation, differentiation, and integration techniques using computational tools (e.g., Excel or calculators), ensuring accurate and efficient numerical analysis.

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4. Mapping of Course Outcomes (COs) to Program Outcomes (POs) and Program Specific Outcomes (PSOs)

The mapping demonstrates how each course contributes to achieving the broader program goals. The strength of the correlation is indicated as follows:

- **3**: High correlation
- **2**: Moderate correlation
- **1**: Low correlation
- **-**: No correlation

Mapping Table: Course 3 (Analysis and Design of Experiments)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3

CO1	3	3	1	2	1	2	1	3	3	2
CO2	3	3	2	3	1	2	2	3	3	2
CO3	3	3	2	3	1	2	2	3	3	2
CO4	3	3	2	3	1	2	2	3	3	2
CO5	3	3	2	3	2	2	2	3	3	3
CO6	2	2	3	2	3	3	2	2	2	3

Explanation of Mapping:

- **CO1**: Strongly aligns with PO1, PO2, PSO1, and PSO2 due to its focus on ANOVA and agricultural applications, with moderate research (PO4) and ethical (PO6) contributions.
- **CO2–CO4**: High correlation with PO1, PO2, PO4, PSO1, and PSO2 for designing and analyzing experiments (CRD, RBD, LSD), with moderate computational (PO3) and lifelong learning (PO7) alignment.
- **CO5**: Adds communication (PO5) and industry readiness (PSO3) through factorial experiment analysis, maintaining strong technical and research alignment.
- **CO6**: Emphasizes PO3, PO5, PO6, and PSO3 for Excel-based analysis and ethical reporting, with moderate contributions to other outcomes.

Mapping Table: Course 4 (Numerical Analysis)

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	3	2	1	-	1	2	3	2	1
CO2	3	3	2	2	-	1	2	3	2	2
CO3	3	3	2	2	-	1	2	3	2	2
CO4	3	3	2	2	-	1	2	3	2	2
CO5	3	3	2	2	-	1	2	3	2	2
CO6	2	2	3	2	2	2	2	2	2	3

Explanation of Mapping:

- **CO1–CO5**: Strongly align with PO1, PO2, and PSO1 for mastering numerical techniques (finite differences, interpolation, differentiation, integration), with moderate contributions to PO3 (computational tools), PO4 (research), PO7 (lifelong learning), and PSO2 (decision-making).
- **CO6**: Emphasizes PO3 and PSO3 for computational implementation, with moderate alignment to PO5 and PO6 for communicating results and ethical practices.