

COURSE WISE & SUBJECT WISE OUTCOME

UG GENERAL COURSE (B.Sc.) IN STATISTICS

UNDER CURRICULUM & CREDIT FRAMEWORK

INTRODUCED BY UNIVERSITY OF CALCUTTA, 2022

DEPARTMENT OF STATISTICS

The course outcomes of the different papers offered by University of Calcutta and followed by this college are as below. After completion of the course, students will be able to:

MULTI DISCIPLINARY COURSE

Course Code	Course Title	Credits	Course Outcomes
STAT-MD-CC1-1-Th	Descriptive Statistics I & Probability I-Theory	3	Unit 1 (Statistics Fundamentals): <ul style="list-style-type: none">• Understand statistical population and sample concepts• Classify different types of data and measurement scales• Apply methods for data presentation and representation Unit 2 (Descriptive Statistics): <ul style="list-style-type: none">• Calculate measures of central tendency• Compute measures of dispersion• Analyze data distribution using moments, skewness, and kurtosis• Construct and interpret box plots• Identify and handle outliers Unit 3 (Probability): <ul style="list-style-type: none">• Define probability through different approaches• Understand random experiments and sample space• Apply probability laws and theorems• Solve conditional probability problems• Use Bayes' theorem for probability calculations
STAT-MD-CC1-1-P	Descriptive Statistics I & Probability I-Practical	1	Unit 1 (Data Representation): <ul style="list-style-type: none">• Create diagrammatic representations of data• Construct frequency and cumulative frequency distributions• Develop stem and leaf plots Unit 2 (Central Tendency and Dispersion): <ul style="list-style-type: none">• Solve problems involving measures of central tendency• Calculate measures of dispersion• Compute combined mean and variance• Analyze coefficient of variation

			<p>Unit 3 (Distribution Analysis):</p> <ul style="list-style-type: none"> • Solve problems related to moments, skewness, and kurtosis • Construct quantile-based measures • Create box plots • Identify and handle outliers <p>Unit 4 (Probability Applications):</p> <ul style="list-style-type: none"> • Solve application problems using classical probability definition • Apply Bayes' Theorem to probability scenarios
STAT-MD-CC2-2-Th	Descriptive Statistics II & Probability II-Theory	3	<p>Unit 1 (Bivariate Data Analysis):</p> <ul style="list-style-type: none"> • Analyze bivariate data using scatter diagrams • Compute simple correlation • Apply linear regression and least squares principle • Fit polynomial and exponential curves • Calculate correlation ratio and index <p>Unit 2 (Categorical Data):</p> <ul style="list-style-type: none"> • Construct and interpret contingency tables • Assess independence and association of attributes <p>Unit 3 (Random Variables):</p> <ul style="list-style-type: none"> • Define discrete and continuous random variables • Understand cumulative distribution and probability functions • Calculate expectation and variance • Apply standard probability distributions (Uniform, Binomial, Poisson, Normal)
STAT-MD-CC2-2-P	Descriptive Statistics II & Probability II-Practical	1	<p>Unit 1 (Bivariate Data):</p> <ul style="list-style-type: none"> • Solve problems analyzing bivariate data • Calculate rank correlation measures <p>Unit 2 (Categorical Data):</p> <ul style="list-style-type: none"> • Analyze categorical data using contingency tables <p>Unit 3 (Probability Distributions):</p> <ul style="list-style-type: none"> • Calculate expectation and variance • Fit binomial distributions • Apply binomial distribution problems • Fit Poisson distributions

			<ul style="list-style-type: none"> Solve Poisson distribution problems <p>Unit 4 (Normal Distribution):</p> <ul style="list-style-type: none"> Calculate normal distribution areas Find ordinates for specific areas Solve application-based problems Fit normal distributions with and without given parameters
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INTERDISCIPLINARY COURSE(IDC)

Course Code	Course Title	Credits	Course Outcomes
STAT-IDC-TH	Statistics for Practitioners - Theory	2	<p>Unit 1 (Univariate Data Understanding):</p> <ul style="list-style-type: none"> Distinguish types of variables and data Learn data collection methods Apply data presentation techniques Calculate central tendency measures Compute dispersion measures Understand skewness and kurtosis visually <p>Unit 2 (Bivariate Data Analysis):</p> <ul style="list-style-type: none"> Analyze paired data Calculate correlation coefficients Understand correlation measures Perform linear regression (two and three variables) Analyze attribute associations using contingency tables <p>Unit 3 (Statistical Inference):</p> <ul style="list-style-type: none"> Understand binomial and normal population characteristics Learn hypothesis testing concepts Apply statistical tests for proportions Conduct tests for sample means Compare means using single and paired samples <p>Unit 4 (Advanced Statistical Techniques):</p> <ul style="list-style-type: none"> Apply one-way and two-way ANOVA Understand Kruskal-Wallis test Determine sample sizes Estimate population parameters Introduce logistic regression for binary data

STAT-IDC-P	Statistics for Practitioners - Practical	1	<p>Unit 1 (Descriptive Statistics):</p> <ul style="list-style-type: none"> • Calculate univariate descriptive measures • Compute mean, median, mode • Determine range, quartile deviation, standard deviation <p>Unit 2 (Correlation and Regression):</p> <ul style="list-style-type: none"> • Fit linear regression for bivariate and multivariate data • Calculate Pearson's and Spearman's correlation • Analyze attribute associations using contingency tables <p>Unit 3 (Hypothesis Testing):</p> <ul style="list-style-type: none"> • Perform tests for proportions • Conduct mean tests for single, two-sample, and paired samples • Apply p-value approach in statistical testing <p>Unit 4 (Advanced Statistical Techniques):</p> <ul style="list-style-type: none"> • Apply one-way and two-way ANOVA • Conduct Kruskal-Wallis test • Determine sample sizes • Estimate population parameters • Implement logistic regression for binary data
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SKILL ENHANCEMENT COURSE (SEC)

Course Code	Course Title	Credits	Course Outcomes
STAT-MD-SEC-TH	An Introduction to R-Theory	3	<p>Unit 1 (R Basics):</p> <ul style="list-style-type: none"> • Install and use R command line environment • Perform basic arithmetic operations • Use standard mathematical functions • Understand R's computational philosophy <p>Unit 2 (Data Structures):</p> <ul style="list-style-type: none"> • Create and manipulate vectors • Understand different number types in R • Extract vector subsets • Use summarization functions <p>Unit 3 (Graphical Capabilities):</p>

			<ul style="list-style-type: none"> • Create basic plots (plot, lines, abline) • Generate bar plots, pie charts, histograms • Construct box plots <p>Unit 4 (Advanced Operations):</p> <ul style="list-style-type: none"> • Perform matrix operations • Load data from files • Work with dataframes • Conduct numerical integration • Solve equations numerically • Perform simulations
STAT- MD- SEC-TU	An Introduction to R-Tutorial	1	<p>Unit 1 (R Basics):</p> <ul style="list-style-type: none"> • Practicing R installation • Exploring command line operations • Performing basic arithmetic computations <p>Unit 2 (Data Structures):</p> <ul style="list-style-type: none"> • Creating and manipulating vectors • Extracting vector subsets • Using summarization functions <p>Unit 3 (Graphical Capabilities):</p> <ul style="list-style-type: none"> • Generating different types of plots • Customizing plot parameters <p>Unit 4 (Advanced Operations):</p> <ul style="list-style-type: none"> • Performing matrix operations • Loading and handling data files • Conducting basic numerical simulations

PROGRAMME OUTCOME

- **PO1:** Develop a strong foundation in statistical concepts, methods, and theories, enabling students to analyze and interpret data effectively across various disciplines.
- **PO2:** Equip students with the ability to apply statistical techniques to solve real-world problems using modern tools and software.
- **PO3:** Gain proficiency in collecting, organizing, and analyzing data to draw meaningful conclusions and make data-driven decisions.
- **PO4:** Foster critical thinking and research aptitude to address complex issues through statistical modeling and experimental designs.
- **PO5:** Apply probability theory and statistical distributions to model uncertainties and make informed predictions.
- **PO6:** Integrate statistical knowledge with fields like economics, biology, computer science, and social sciences to address interdisciplinary challenges.
- **PO7:** Understand and uphold ethical standards in data handling, reporting, and professional conduct.
- **PO8:** Develop skills to present statistical findings and interpretations clearly through reports, visualizations, and oral presentations.
- **PO9:** Encourage a culture of continuous learning and adaptation to new statistical methodologies and technologies.
- **PO10:** Prepare students for advanced studies, research opportunities, and professional roles in industries like analytics, finance, healthcare, and government.

PROGRAMME SPECIFIC OUTCOME

- **PSO1:** Develop in-depth knowledge of statistical theories, methods, and principles to analyze and interpret data effectively in real-world contexts.
- **PSO2:** Demonstrate expertise in using statistical software such as R.
- **PSO3:** Apply statistical techniques in diverse fields, including finance, healthcare, social sciences, environmental studies, and machine learning.
- **PSO4:** Design and execute statistical experiments, surveys, and sampling methods to collect and analyze data for research and decision-making.
- **PSO5:** Build mathematical models using probability and stochastic processes to address uncertainties in practical scenarios.
- **PSO6:** Interpret and solve problems related to standard probability distributions and statistical inference with clarity and precision.
- **PSO7:** Cultivate the ability to critically evaluate statistical outcomes and communicate findings effectively through reports and presentations.
- **PSO8:** Foster research skills and a problem-solving mindset to undertake advanced studies or pursue careers in industries like analytics, actuarial science, and data science.
- **PSO9:** Apply ethical principles and uphold data integrity while working with sensitive datasets and statistical results.
- **PSO10:** Equip students with lifelong learning abilities to stay updated with evolving statistical methodologies and technological advancements.