Course Code	ECAP790	Course Title	PROBABILITY AND STATISTICS

WEIGHTAGES		
CA	ETE(Th.)	ETE (Pr.)
30	40	30

Course Outcomes:

CO1: experiment to carry out simple data investigations for categorical variables. They interpret and compare data displays. Students conduct chance experiments, list possible outcomes and recognize variations in results.

CO2: measure a random variable that describe randomness or an uncertainty in certain realistic situation

CO3: employ the different types of data and choose an appropriate way to display them.

CO4: identify and compare techniques for collecting data from primary and secondary sources, and identify questions and issues involving different data types

Unit No.	Content
Unit-1	**Introduction to probability:** Elements of Set Theory, Sample Space and Probability Measure, Statistical Independence, Conditional Probability, Counting Sample Points, Mutually and pair wise independent events, multiplication theorem of probability for independent events, Baye's theorem.
Unit-2	**Introduction to statistics and data analysis:** Statistical Inference, Samples, Populations and Experimental Design, Measures of Location: The Sample Mean and Median, Measures of Variability, Discrete and Continuous Data, Statistical Modeling, Scientific Inspection, and Graphical Diagnostics, Graphical Methods and Data Description, General Types of Statistical Studies.
Unit-3	**Mathematical expectations:** Definition, expected value of random variable, expected value of function of a random variable, properties of expectations, Various measures of Central Tendency, Dispersion, skewness and Kurtosis for continuous probability distribution, continuous distribution function, Variance, Properties of variance, covariance.
Unit-4	**Moments:** Chebyshev Inequality, Moments of Two or More Random Variables, Moments of Sums of Random Variables, Moment Generating Function, Properties of moment generating function, cumulants, Raw and central moments.
Unit-5	**Relation between moments:** raw moments & central moments, Effect of change of origin and scale on moments, Pearsonian coefficients Measures of skewness, kurtosis.
Unit-6	**Correlation, regression and analysis of variance:** Pearson's Correlation coefficient, Spearman's Rank correlation coefficient, Regression Concepts, Regression lines, Multiple correlation and regression, Analysis of Variance- One-way classification and two-way classification.
Unit-7	**Standard distribution:** Binomial, Poisson, Negative Binomial Distribution, Normal Distribution and their properties
Unit-8	**Statistical quality control:** Introduction, Process control, control charts for variables – X and R, X and S charts control, charts for attributes: p chart, np chart, c chart and their applications in process control
Unit-9	**Index numbers:** Learn about the need of index numbers, explain the different methods of constructing index numbers, evaluate the tests for judging the soundness of an index number.
Unit-10	**Time series:** Explain about time series, describe components of time series, and define measurement of variations of time series.
Unit-11	**Sampling theory:** Sampling Theory, Random Samples and random Numbers, Sampling with and without replacement, sampling distributions, sampling distribution of means, sampling distribution of properties, sampling distribution of differences and sum, standard errors, software demonstration of elementary sampling Theory.
Unit-12	**Hypothesis testing:** Definition of hypothesis, interpret statistical procedure of hypothesis testing, use application of hypothesis testing in several business contexts.
Unit-13	**Tests of significance:** Based On t, F and Z Distributions: -Student's (t) distribution, definition, properties, critical value of t, Application of t-distribution, Test for single mean, t-test for difference of mean, Fischer Z- transformation, F-statistic, critical value of F distribution, application.
Unit-14	**Statistical tools and techniques:** Bayesian Concepts, Bayesian Inferences, Bayes Estimates Using Decision Theory Framework, Statistical Tools: Excel, R-Studio

	and SPSS.

READINGS:

1. FUNDAMENTALS OF MATHEMATICAL STATISTICS by S.C. GUPTA AND V. K. KAPOOR, SULTAN CHAND & SONS (P) LTD.
2. PROBABILITY & STATISTICS FOR ENGINEERS & SCIENTISTS by RONALD E. WALPOLE, PEARSON