CAP747:PROBABILITY AND STATISTICS

Course Outcomes: Through this course students should be able to

CO1 :: Demonstrate understanding of basic concepts in data science, relating to probability and statistics.

CO2 :: Describe the basic probability concepts such as mean, variance, conditional probability, Bayes rule and statistical independence.

CO3 :: Understand how real-world phenomena can be modeled using probability distributions.

CO4 :: Analyze statistical data using measures of central tendency, dispersion and location.

Unit I

Introduction to statistics : different types of data, tables, charts, histograms, frequency distributions, measures of central tendency: mean, median, mode, box whisker plot, measures of dispersion: range, inter-quartile range, deviation, variance, standard deviation, standard error

Unit II

Descriptive statistics : skewness and kurtosis, measures of association: bi-variate data and covariance, pearson correlation coefficient, spearman's rank correlation coefficient, chi-square test, relative risks and odds ratio, ANOVA

Unit III

Probability concepts : probability concepts: random experiment, sample space, events, the axioms of probability, algebra of events, conditional probability, multiplication theorem of probability, independent events, bayes theorem and its applications

Unit IV

Probability distribution : random variable, discrete random variable, continuous random variable, expected value and variance, discrete distributions, continuous distributions, binomial, poisson, uniform, normal distribution, standard normal, exponential distribution

Unit V

Statistical computation : hypothesis testing, means and proportions, type I and type II errors, one tail, two-tail tests, tests of significance – student's t-test, single mean, difference of means, paired t-test, test of goodness of fit, independence test

Unit VI

Curve fitting and statistical tools : curve fitting: curve fitting by method of least squares, fitting of straight lines, polynomials, exponential curves, regression analysis, linear and non-linear regression, multiple regression, chi-square analysis, introduction to software tools for statistical analysis like SPSS, R, microsoft excel

Text Books:

1. PROBABILITY AND STATISTICS FOR ENGINEERS by DR. J. RAVICHANDRAN, WILEY

References:

1. APPLIED STATISTICS AND PROBABILITY FOR ENGINEERS by DOUGLAS C. MONTGOMERY, GEORGE C. RUNGER, WILEY